MARCH 10, 1938

FIRST AERO WEEKLY IN THE WORLD

REGD. AT THE G.P.O. AS A NEWSPAPER

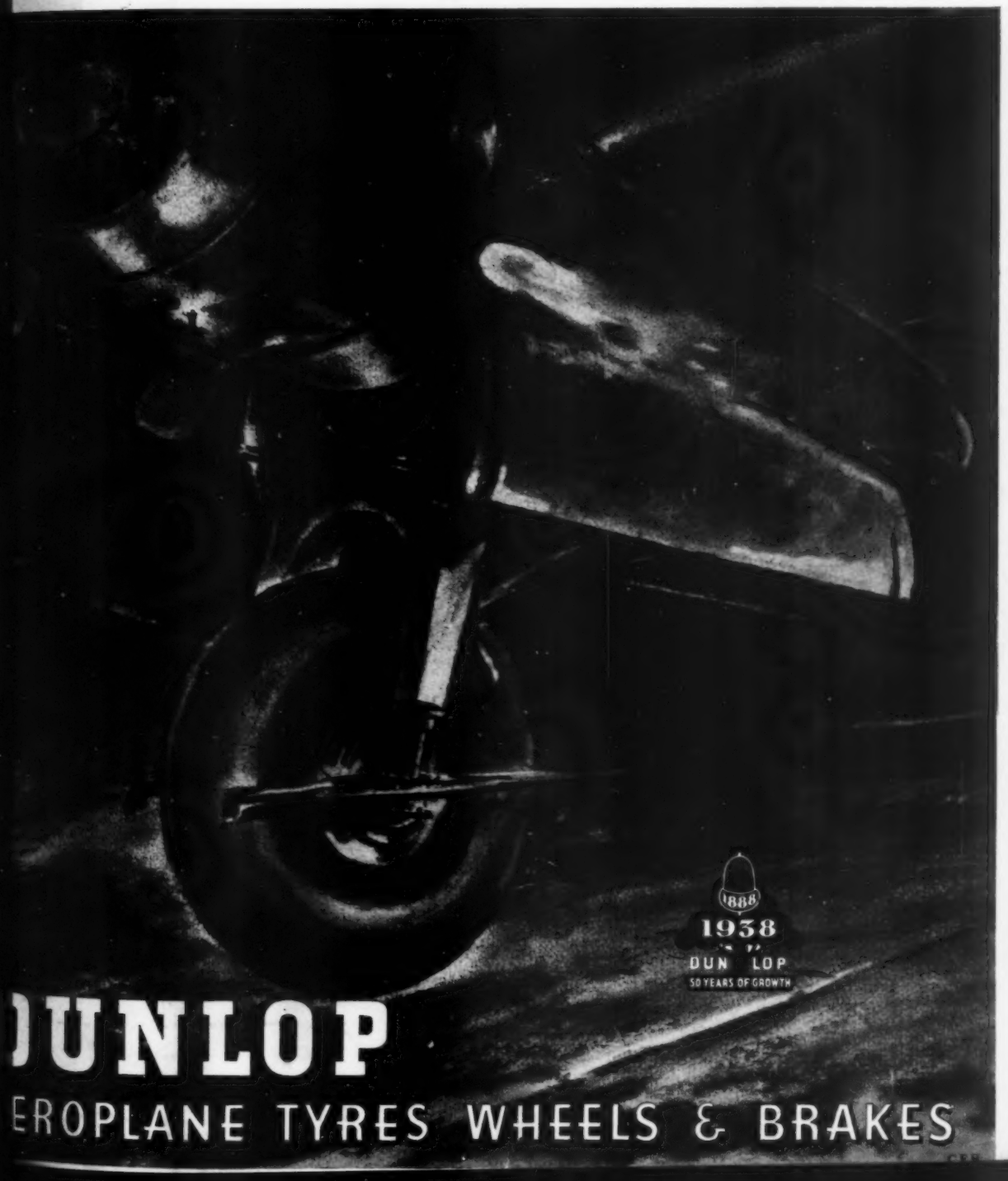
MAR 22 1938

FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

SIXPENCE
EVERY THURSDAY



CROWE
"Bristol"
BOMBAY • BOMBER • TRANSPORT
TYPE 130
THE BRISTOL AEROPLANE CO. LTD. FILTON BRISTOL

FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editor C. M. POULSEN

Managing Editor G. GEOFFREY SMITH

Chief Photographer JOHN YOXALL

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1

Telegrams: Truditur, Selin, London. Telephone: Waterloo 3333 (50 lines).

HERTFORD ST., COVENTRY. Telegrams: Autocar, Coventry. Telephone: Coventry 5210.

GUILDHALL BUILDINGS, NAVIGATION ST., BIRMINGHAM, 2. Telegrams: Autopress, Birmingham. Telephone: Midland 2971.

260, DEANSGATE, MANCHESTER, 3. Telegrams: Iliffe, Manchester. Telephone Blackfriars 4412.

26B, RENFIELD ST., GLASGOW, C.2. Telegrams: Iliffe, Glasgow. Telephone: Central 4857.

SUBSCRIPTION RATES: Home and Canada: Year, £1 13 0, 6 months, 16s. 6d., 3 months, 8s. 6d. Other Countries: Year, £1 16 0, 6 months, 18s. 0d., 3 months, 9s. 0d.

No. 1524. Vol. XXXIII. MARCH 10, 1938. Thursdays, Price 6d.

The Outlook

The Cadman Report

THOSE who had taken too seriously some of the wilder newspaper guesses concerning the Cadman Committee's Report must have been somewhat disappointed when the Report actually became available with the Government's decisions last Tuesday night.

Nevertheless, this Report is a distinctly vigorous one, and some of the criticisms made—particularly those dealing with the management and conduct of Imperial Airways—are among the most pungent which have ever appeared in an official publication. Among the results of these particular observations is the decision that a whole-time chairman, and at least one whole-time director to be associated with him, should be appointed to the board.

More important, perhaps, are the accepted recommendations in the matter of external air transport operations, designed primarily to remove the somewhat absurd situation which arises when two subsidised companies are running in competition over the same route. Imperial Airways will be primarily concerned in future with their Empire services, though they will continue to cover the European sections which are, so to speak, already part of those to Africa, India and Australia. That is only reasonable—so long as arrangements for transporting passengers to and from (for instance) Italy and Greece can be made.

British Airways, suitably reorganised, will take over other present and future services in Europe, with the exception of that between London and Paris. Here the difficulties have been surmounted by a proposed amalgamation of the two companies.

There is no suggestion in the Government's decisions that any further companies, whether already formed or likely to be formed, will be eligible for a share in the subsidies, the total of which will be increased from the present £1,500,000 to £3,000,000. It did not require the findings of the Cadman Committee to force such an increase—which, were it not for the "fly-by-yourself" dictum, could have been made ten or fifteen years ago.

The internal services are not, after all, to be assisted in any way. The suggestion even that the petrol tax should be reduced for them was turned down flat. Nor are the airport owners to be subsidised, though, following the Maybury Committee's recommendations, grants will be made in the matter of equipment.

Personnel

WITH the Cadman decisions concerning the creation of new posts in the Air Ministry it is difficult to quarrel. In theory at least they should do good, and they cannot very well do harm, although, as *Flight* pointed out some weeks ago in commenting on the Report rumours, the man always matters more than the post.

That the post of Under-Secretary of State for Air should be permanent instead of transitory is all to the good. The subject of aviation is one which is not "picked up" in a few weeks or months, and the unending stream of Under-Secretaries who have filled the office during the last fifteen years cannot have contributed either to efficiency or to continuity of policy. A Permanent Under-Secretary should be able to take the long view and plan accordingly.

Possibly of considerable practical advantage, but otherwise of relatively small importance, is the decision to create a post of Deputy Director-General of Civil Aviation. Whether the Director-General is relieved in this manner or by transferring some of his routine duties to existing members of the department is of minor importance. The main thing is that he should be left free to give his attention to matters of broad policy and to planning, in collaboration with the Permanent Under-Secretary, for the future. He should also take a strong part in international problems, which are bound to increase in importance with the years.

The establishment of a Directorate of Civil Research and Production must be welcomed wholeheartedly. While the nation is straining every nerve to achieve military ascendancy, it is not to be expected that the present organisation can devote to purely civil problems that degree of sympathetic attention which civil aviation demands. The new Directorate will, to some extent, compete with the existing Directorates of Scientific Research and Technical Development, and many will be the cases of doubt as to whether a certain line of research is of interest primarily to the civil or military side. Frequently, of course, research is of equal benefit to both. It is to be assumed that when the two sides clash in their claims to priority (we have but a limited number of research establishments) the Permanent Under-Secretary will give the final decision.

The Report and the Government's decisions thereon will be dealt with in detail next week.

THE OUTLOOK (CONTINUED)

The Price of Things

WELL, the taxpayer knows the worst. Or does he? According to the Statement relating to Defence he will be asked to find, during the financial years 1937-1941, not less than fifteen hundred million pounds, for, of course, the taxpayer always foots the bill in the end, even if the fact is cleverly disguised from him. If he does not pay directly he pays indirectly.

It is a rather eloquent commentary on the magnitude of the figures involved nowadays that the Statement on Defence has ceased to print the amounts for expenditure in ordinary figures, and has evolved a curious mixed grill to enable the ordinary reader to understand what is meant. For instance, the Statement points out that the three Defence Departments are expected to spend this year a total of £278¼ millions. Put that way, it does not look such a terrible lot, does it? But we shall still be expected to find £278,250,000. In spite of the fact that the Statement expects 1939 to be the peak year of armament expenditure, we may still live to see the astronomer's "light year" introduced as the unit of expenditure on armaments.

The pity of it all is that much of this expenditure could have been avoided. Had Great Britain maintained a sensible level of defence during the last ten years there would in the first place have been no need to go to such fantastic expenditures as are now necessary. Certain other nations would have hesitated had Great Britain given a clear and unmistakable indication of her intention to rely largely on her own strength. Instead of that she reduced her defence forces almost to vanishing point. That "gesture" is now proving an expensive one, and we are having to pay more owing to the panic expansion than if we had spread the ordering of the same amount of defence material over a greater number of years.

The Air Estimates

TURNING from the subject of general defence to that of air defence, it is found that a total of £111½ millions (to use the mixed grill designation) is budgeted for in the Air Estimates. The whole of this amount will not have to be borne by the air vote, as the Fleet Air Arm Grant, other appropriations-in-aid, and a sum of £30 millions from the Consolidated Fund, amount to approximately £38 millions, but the nation still has to find that money, no matter under which head it is being spent. The net Estimate to be voted is thus one of £73½ millions. In this connection it is interesting to recall that ten years ago the corresponding figure was £16¼ millions. In the 1928 Air Estimates the total numbers to be voted for the R.A.F. were 32,500. This year the figure has increased to 83,000. How the cost has gone up is shown by the fact that in 1928 the Net Air Estimate represented exactly £500 per head of the 32,500 voted. In the 1938 Estimates the net cost has gone up to £885 per man. The fact is mentioned without any attempt to deduce any lesson.

As in previous years, by far the largest individual vote is No. 3, Technical and Warlike Stores, the gross total of which amounts to £66,734,000. Appropriations-in-aid reduce this to £42,631,000. Hitherto it has been customary in the Air Estimates to explain how much in the appropriate sub-head was set aside for aircraft, engines, aircraft spares, and engine spares. This year, for the first time, the Estimates maintain a discreet silence on this point and merely state that the total sum for sub-head C of Vote 3 is £42,680,000. This figure includes balloons, upon which we used to spend but a modest £32,000. How much we spend upon them now is not stated, but the balloon barrage scheme must cost a considerable sum. The Estimates merely mention under sub-head C of Vote 3 that "provision is also made for the purchase and repair by contract of balloons, winches, and hydrogen cylinders."

Warlike Stores and Supplies, sub-head D of Vote 3, is the next largest, with close upon £13 millions. This sub-head covers armament and ammunition, and also petrol and oil for the R.A.F.

Experimental and Research Establishments share a relatively modest £623,000, of which the R.A.E., Farnborough, accounts for the lion's share with £459,500. Significantly enough, with the exception of the Airworthiness Department at Farnborough, the Research Station at Bawdsey shows the next largest amount with £45,300.

Helping Civil Aviation

AT long last the Air Estimates bear evidence of a willingness to give civil aviation the support it needs. The net total under this vote is £2,925,000, a figure which represents an increase of £610,000 compared with last year. The explanatory note to Vote 8 explains that the increase is due mainly to the additional subsidy payments arising from the introduction of the full Empire air mail scheme and to provision for improvements to ground organisation in the United Kingdom, in accordance with the recommendations of the Maybury Committee. The figure does not include the salaries of the headquarters staff of the Director-General of Civil Aviation, which are shown under another vote and amount of £55,621.

For the first time in history the Civil Aviation Vote contains an item of £20,000 for "training of civil pilots." The presence of this item in the vote is not explained, but perhaps there is some justification for believing that it refers to the scheme, mentioned in the Maybury Report, for training short-service officers as airline pilots. Something of the sort has been badly needed for a long time, past experience being that an officer who has left the R.A.F. is of very little use to airline companies until he has forgotten most of his R.A.F. training and learnt to approach civil flying from a totally different angle.

The severe criticisms of Croydon appear to have borne fruit. London's Terminal Aerodrome is to have some £215,000 spent on it, a new hangar being estimated to require £120,000, and improvements to the landing area £42,000.

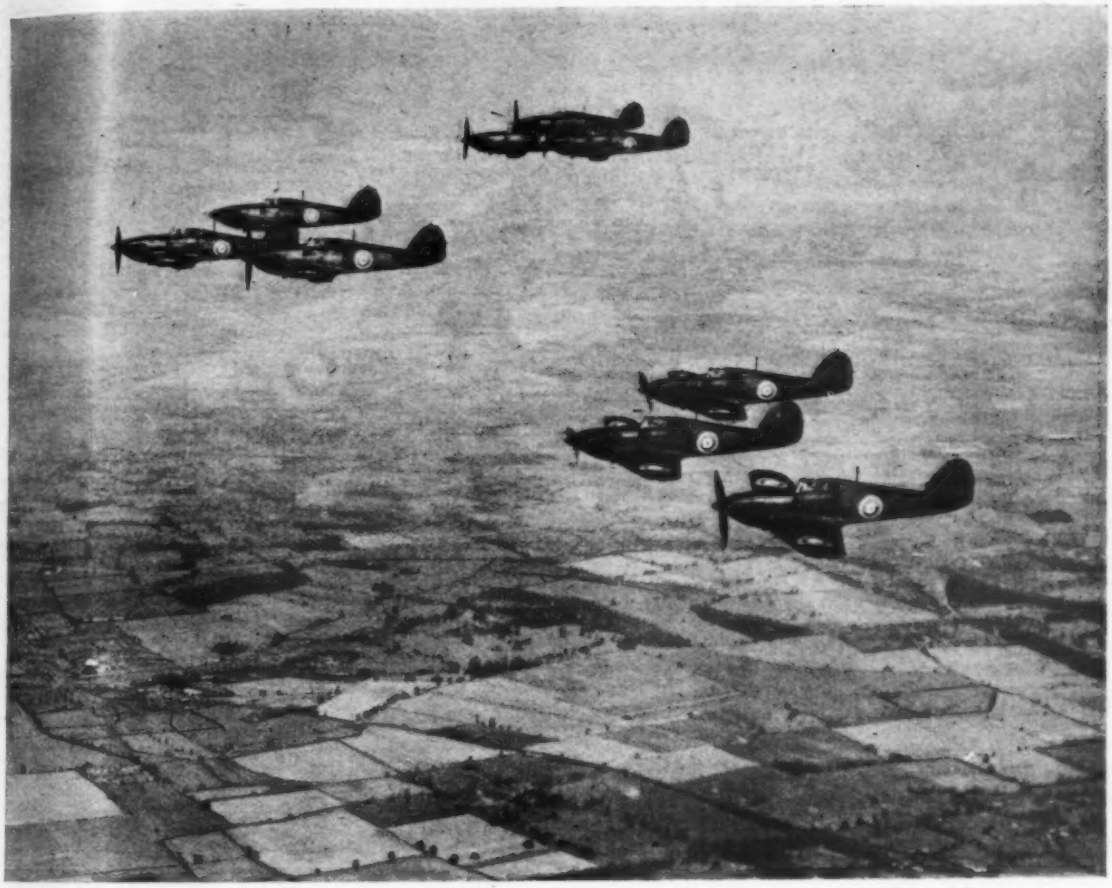
Subsidies and Grants total £1,243,000, Imperial Airways and British Airways sharing the bulk of £1,167,000. The light plane clubs have had their subsidies increased from £35,000 to £40,000, and the gliding clubs receive as before a grant of £5,000. Grants towards the expenses of the Air Registration Board amount to £10,000.

Paying the Piper

IN the Naval Estimates just published an increase of over a million and a half pounds appears under the heading of Fleet Air Arm. Part of this is payment for the training facilities to be provided at R.A.F. flying schools for naval pilots. Under the old dispensation the Air Ministry made no charge for this training, because the pilots all held R.A.F. commissions, temporary or otherwise. The Navy, therefore, got its pilots trained free, as the Army still does. From now onward naval pilots will gradually cease to hold R.A.F. commissions, and therefore it is only right that the Admiralty should pay for their training.

This point may seem only a matter of accounting, of small interest to the taxpayer, as the whole cost of defence has to come out of taxes or loans. It is, however, important that the public should be told clearly what each of the defence Services costs. So long as the cost of the Fleet Air Arm was included in the gross estimate for the Air Ministry the public was inclined to think that air defence was more expensive than it actually was and that naval defence was relatively cheaper. Not everybody could appreciate the meaning of an appropriation-in-aid.

For this year the amount expended by the Admiralty on the Fleet Air Arm again appears as an appropriation-in-aid in the Air Estimates, but when the transfer of the F.A.A. has been completed, then the cost of that arm will be a matter for the Admiralty alone and will be paid for directly out of the Naval Estimates—except, of course, the charge for teaching the naval pilots to fly.



CONTROLLED POWER : The world's most formidable fighter squadron—No. 111 from Northolt—demonstrating their mastery of the Hawker Hurricane multi-gun single-seater fighter monoplanes with which they have lately been equipped. The Hurricane is the fastest military aircraft in service anywhere in the world.

Civilian Rights in War

A VERY curious lecture was delivered before the Royal United Service Institution last week by Capt. P. A. Landon, M.C., on the international law of bombardment. The lecturer made it clear that he was not discussing what ought to be, but only stating the law as it is. He stuck closely to this text. He laid it down very definitely that civilian life was sacrosanct and that military operations should not be undertaken if they endangered civilian life. From this he drew the conclusion that the functions of aircraft in land war ought strictly to be confined to reconnaissance, as bombing endangers civilians.

If the statement made by the lecturer—an acknowledged authority—is actually the international law, it certainly ought to be altered. We say this, not because we have any thirst for baby-killing, but because it is a fact that a law which attempts to forbid too much is sure to be disregarded by universal practice, and this tends to bring all law into contempt.

If we remember right, Mr. Spaight, another acknowledged authority on the subject, and one quoted several times by the lecturer with respect, has written that belligerents have certain natural and inherent rights and that an international law which does not recognise them is sure to be of no effect. He holds, for example, that workers in a munition factory can claim no immunity from bombing while they are in the factory, though they can make such a claim when in their homes. Too many Air Forces in the world are apt to claim that they are above all laws, perhaps because international law forbids too much. It would be an advantage to the world if that law were amended on practical lines which respected civilian rights but also recognised the necessities of the armed forces.

Rating Pilots

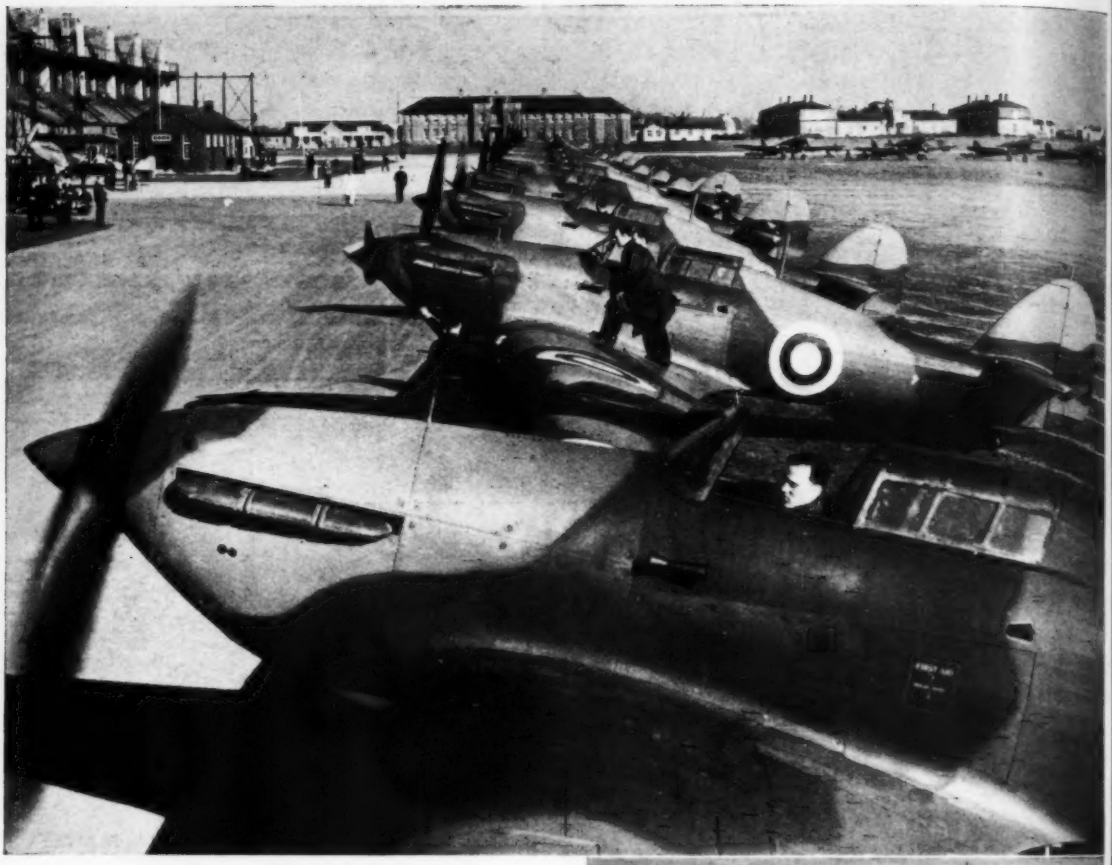
THE Admiralty has lost little time in announcing its preliminary scheme for making use of ratings as pilots in the Fleet Air Arm.

The regulations just published deal only with the means of selecting candidates, and barely outline the career which lies before those who will be selected.

On the subject of the training of these rating pilots the Admiralty order is not explicit. It merely says that preliminary training for a year will be carried out on shore, and will be followed by eight weeks on a training cruiser. H.M.S. *Furious* has now become a training carrier. It may be presumed that the rating pilots will be taught to fly, as the naval officers will be, and as airmen pilots are, at the ordinary civilian and Service flying schools.

Handing Over Stations

THE Admiralty and Air Ministry are still discussing what stations are to be handed over to the former by the latter, and no announcement has yet been made. The School of Naval Co-operation, where naval officers are trained as air observers, has been moved from Lee-on-the-Solent to Ford. The move of the school to Ford suggested that the Air Ministry was loath to part with Lee, a well-developed station, but was ready to hand over one on which it had not yet spent so much money. On the other hand, it has been announced that the final specialised training of naval pilots in Fleet Air Arm work is to be carried out between Gosport, Lee and Ford. That would suggest that all these three stations are to go to the Admiralty, but neither Ministry will admit that such a decision has been made.



HURRICANES IN SERVICE

No. 111 (Fighter) Squadron shows off its new equipment

TRAVELLERS on Western Avenue, that famous (or notorious) London exit, are getting used to one of the most comforting manifestations of Expansion. No. 111 (F.) Squadron, at Northolt, is putting in all the time it can on its drab but deadly looking Hawker Hurricane multi-gun, "three-hundred-plus" monoplane fighters. Had it not been for Sqn. Ldr. Gillan's Turnhouse-Northolt trip at 408.75 m.p.h., the equipment of the squadron would most probably still be a State secret. Happily, it was decided that the world should be given some indication of the Hurricane's capabilities, though reports of strong aiding winds still kept the masses guessing at the full-throttle level speed of our first fighter to better 300 m.p.h.

There is no doubt whatever that No. 111 is, at the moment, the most formidable fighting squadron in the world. Although the actual armament of the Hurricane is secret, references have been made in the Press to the colossal weight of fire at the command of a Hurricane unit.

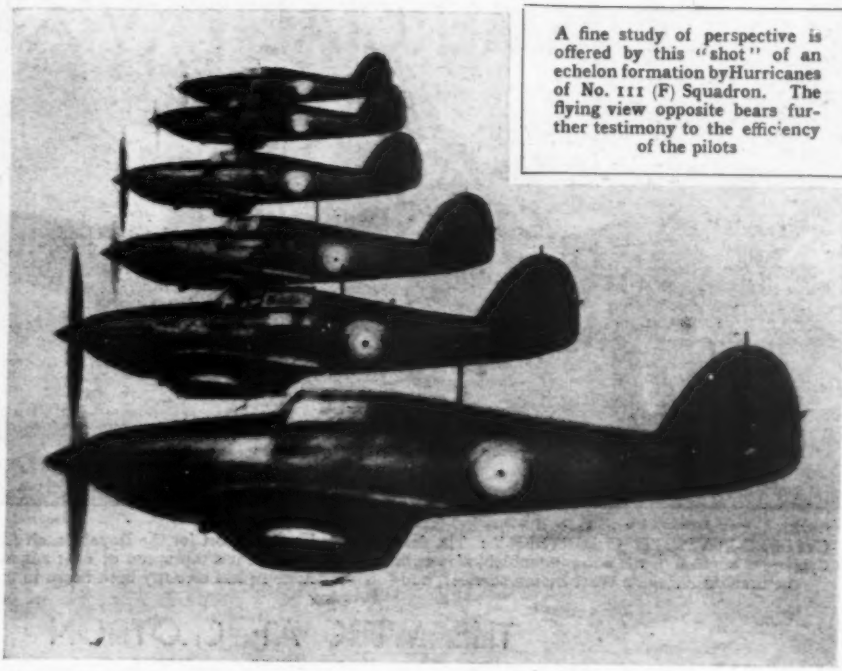
The engine is a Rolls-Royce Merlin II rated at 960/995 h.p. at 12,000ft.; maximum power is 1,050 h.p. at 16,000ft. at 3,000 r.p.m. Glycol cooling is employed, the system utilising a radiator in a scoop-shaped housing under the pilot's cockpit, and the airscrew is a fixed-pitch wooden two-blader. All three wheels of the undercarriage are retractable.

Full two-way radio equipment and night-flying gear is carried, and the pilot's cockpit is warmed and covered by

How the Rolls-Royce Merlin II permits clean entry and a generally compact installation in the Hurricane. The common housing for the oil and glycol radiators is apparent in the *Flight* photograph of the nose

a transparent sliding roof. The new service blind-flying panel is specified.

In view of the fact that there has lately been some heated talk about delay in the introduction of fighter monoplanes into the Service, and considering some of the fantastic reports of foreign equipment, *Flight* feels that it should be made clear that America has only a very small number of comparable (but poorly armed) Seversky machines actually in service, and that none of the new Curtiss monoplanes have been delivered; that France has very few, if any, Morane 405s with the squadrons; that Italy's single-seater fighters are mainly biplanes which compare unfavourably even with the Gauntlet, not to mention the Gladiator, and that, although Germany is known to have a number of Messerschmitts with Junkers engines on charge, the performance and armament of these machines probably show up rather poorly against the Hurricane. So we may be proud of No. 111 Squadron.

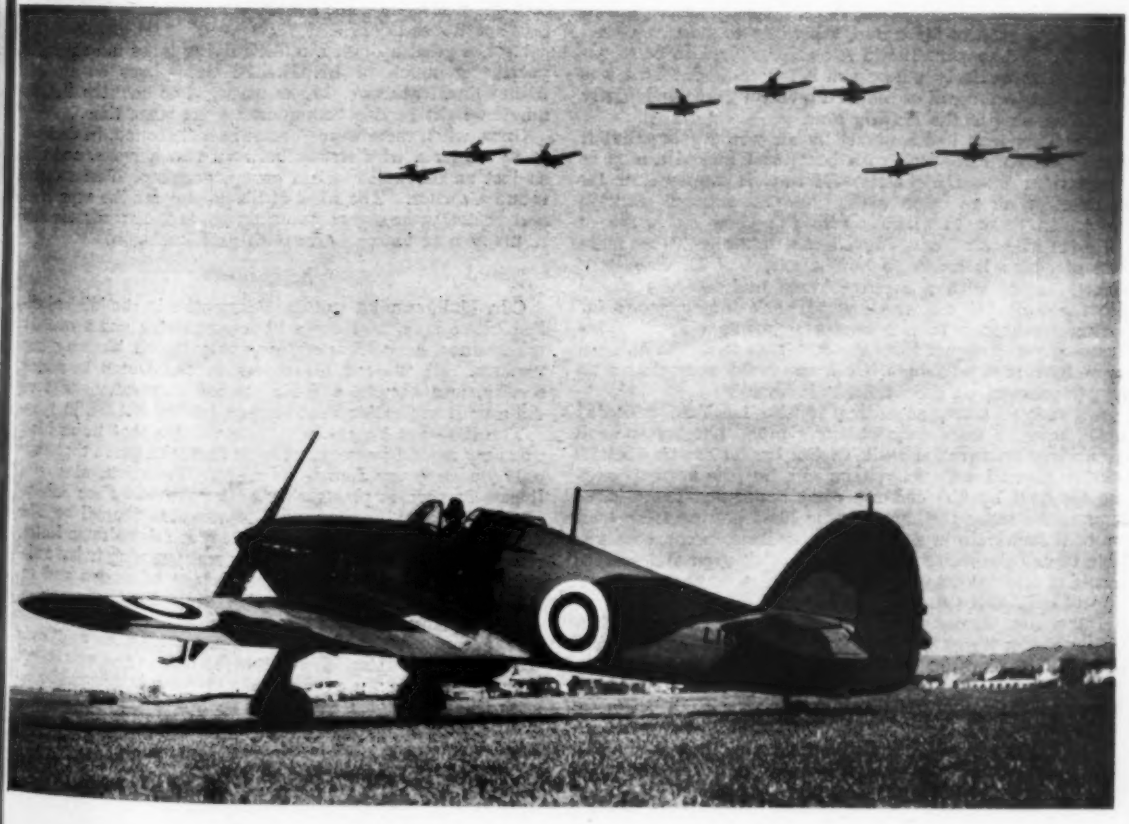


A fine study of perspective is offered by this "shot" of an echelon formation by Hurricanes of No. 111 (F) Squadron. The flying view opposite bears further testimony to the efficiency of the pilots

That the personnel is equal to the material was readily apparent at Northolt last Friday afternoon when the complete squadron demonstrated formation flying.

One was particularly impressed by the very reasonable landing speed of the Hurricanes, though the take-off *did* seem on the long side, particularly where formations were concerned. The wheels disappear without fuss, and once everything is snug the machine is fit and ready to challenge anything with wings.

A demonstration by an individual machine, though not aerobatic in nature, was a revelation of manœuvrability and awesome speed. One turn, particularly, must have generated a formidable amount of "g." It seemed to belie the story that the Hurricane makes a diameter of 3,000ft. in a loop.



COMMERCIAL AVIATION

CYCLONE-POWERED "FOURTEEN": The first Lockheed 14 transport for the Royal Dutch Air Lines. This model has Wright Cyclone G engines (850/1,000 h.p.) which, it is estimated, should give it a top speed of over 265 m.p.h. Machines of this type will be used on K.L.M.'s West Indian services, and this particular 14 has recently been flown to Curaçao by Cdr. Geisendorffer.

THE WEEK AT CROYDON

Spring Rush : Freight Comparisons : Personalities About Pilots : Obsolete Illness

WHEN "Works and Bricks," capering like a slow-motion film of snails at play, start an elaborate system of entrenchments which cannot but last over the whole summer-rush period, we at Croydon know that spring is here. There will, of course, be the usual gipsy encampment, lorries full of tea urns and solid refreshments, and a steam roller with a nice bright fire to make toast by. Last Saturday, coinciding with all this, there was a rush of air traffic, especially to Germany, and the K.L.M. 8.30 a.m. Berlin Air Express had to be duplicated, close on forty passengers being booked. This was due in part to the end of the Berlin Motor Show and partly to the opening of the Leipzig Fair.

Somebody who had a parcel by air was arguing that it was expensive compared with boat, so I looked a step or two further into the matter. If time is money it is far cheaper by air to begin with. Another thing is packing costs. In order to stand up to the good old game of "Porter's Knock" or "Stevedore's Spillikins" (the main rule of which is for A to hurl a parcel at B, who steps smartly aside with a carefree laugh and lets the parcel hit the wall behind) one has to pack fragile goods for surface transport in iron-bound seamen's chests. This heavy packing, apart from the fact that freight is charged by weight, is expensive in itself, and many customers send by air because, on the whole, it is cheaper.

Air freight rates, according to the I.A.T.A. accepted scale, may be more than shipping rates, but try to send by surface transport a weak wicker basket of strawberries merely covered with cellophane as a lid (the normal packing for fruit by air) and see what happens. There is, of course, the story of the man who liked getting fresh fruit by boat and train in a flattened condition, because he was able to dry the flattened mass in a brisk oven and sell the result as oriental door-mats; but the idea makes no general appeal in Covent Garden, I understand.

Pilots are in the news at the moment. Besides Cdr. Geisendorffer flying the first Lockheed Super Electra from California to Curaçao for K.L.M., another of the same company's pilots, Cdr. Fryns, is about to set out on a prolonged tour of Persia and adjacent countries with a party of archæologists.

Capt. Wilcockson is the first commercial pilot of Imperial Airways to fly in the basement of the Mayo composite when the top-floor flat becomes detached—I trust it will never be semi-detached. I have not heard his opinion—which is one of the utmost importance, for what test pilots think is not necessarily based on the same everyday, working experience as the opinion of a man like "Wilkie."

Then there is Capt. Slocum, of British Airways, whose main worry at the moment, I understand, is how to keep sparrows from tearing the crocuses to pieces at his country cottage, where he leads a bachelor life in the intervals of high-speed aviation.

He has piled up half a million flying miles in only eight years, for much of his R.A.F. flying was on Furies. Although a featherweight, he managed to hold the R.A.F. middleweight boxing championship for some time.

Once, when there were "brass hats" around, he decided to fly under a wire strung between two hangars, and did so just as the well-lunched group, gaggle or bluster came round a corner. The wind of his passing set the expensive and glittering headgear prancing across the aerodrome like so many mad March hares with gold knobs on.

Mileage

Cdr. Moll, co-pilot to Cdr. Parmentier in the Mildenhall-Melbourne race, had flown about a million and a quarter miles when he celebrated his thirty-eighth birthday last Sunday. He started his career in the Dutch merchant service, and became a first-class radio operator and then did a spell in the Air Force before joining K.L.M. in 1925.

Tradition yet lingers in remote villages that trains blow up every second journey, whereas statistics prove that they only do so every fourth or more. Tradition, alas, still lingers in various places that airline travellers are habitually air sick. Even so well informed a journal as *The Hotel Review*, in discussing the Croydon Aerodrome Hotel, remarks that it must be extremely embarrassing to have air-sick passengers arriving at 3.30 in the afternoon and requiring a glass of brandy, not as a drink, but as a medicine.

I don't suppose the Airport Hotel gets one genuine case a year from a major airline which is properly run on "over weather" principles. Fly below the clouds and you do get air sickness, but fly over them and there is practically no such thing, though I agree that there are some people who are determined to be ill at all costs. They turn green if anyone spins a top in their vicinity, and are usually victims of train sickness, motor-bus malaise, and horse-cab hiccoughs.

A. VIATOR.

COMMERCIAL AVIATION (CONTINUED) : WORLD NEWS

Practical Study

THE U.S. Bureau of Air Commerce has recently taken delivery of six new Stinson Reliants which form part of their fleet of machines for the use of the newly created Air Navigation Division. The duties of the division consist largely of checking up radio frequencies and communications, and the machines have been specially designed for the purpose and are fitted with, among other items of equipment, two-way radio.

Incidentally, Guinea Airways, of Lae, New Guinea, have also taken delivery of a Reliant which will be fitted with floats and be used for a wide variety of duties.

Astronomical

THE third quarterly issue of loose sheets containing the ephemeral astronomical data for the period between April 1 and July 1, 1938, has just been made for use with the *Air Almanac*. These may be obtained, as before, from H.M. Stationery Office at the price of 2s. 6d.

The *Air Almanac* has, it will be remembered, been recently devised by the Air Ministry, working in collaboration with the Nautical Almanac Office, to meet the special requirements of the air navigator, and these sheets are being issued at regular intervals in order to keep this publication up to date.

Modifications at Heston

WHILE the traffic office and its environment are being enlarged and improved at Heston Airport—with the customary litter of pits and props—the passengers, Customs officials and others are carrying on their normal occasions as well as possible. Their quarters consist of a wooden shed which sits rather like a contractor's office in the middle of the wreckage.

For the moment, nothing is being done about the eastern boundary right-of-way question, though now that the Air Ministry owns the aerodrome matters should soon be moving in this direction.

P.A.A. Landplanes for Atlantic?

FOLLOWING the issue of broad specifications of colossal flying boats for the Atlantic route, Pan American Airways has invited several American constructors to consider the production of 100-passenger landplanes for similar work. A speed of 300 m.p.h. at 25,000ft. is mentioned. The cost of each machine is estimated at £200,000: the power plant will comprise four 2,000 h.p. engines.

Obvious technical advantages conferred by the landplane for long-distance transport, as compared with the flying boat, are better aerodynamic form and decreased structure weight. A cantilever monoplane with suitable flotation gear can be surprisingly seaworthy.

More Self-help

NOW that more and more transport machines have their own loop aerials and crews are encouraged as far as possible to be self-supporting in the matter of navigation, plenty of interest is being shown in the various marine and other radio beacons in the Channel area and elsewhere.

Details of the Orfordness omni-directional transmitter is given in *Notice to Airmen*, No. 32. The beam of minimum intensity in this case rotates clockwise from true west through 360 deg. in one minute, and with the help of a stop-watch it is consequently possible to obtain bearings while using a normal receiver. The beacon is in operation throughout the day for periods of four minutes, starting at 8, 20, 32, 44 and 56 minutes past each hour, and the frequency is 288.5 kc/s (1,040 metres). The call sign is GFP.

Trans-Tasman

IT appears that the Australian Government is preparing an agreement to cover the future air mail service between Australia and New Zealand. This service will be controlled by a company representing the Governments of Australia, New Zealand, and the United Kingdom, and the proposed agreement will probably be very similar to that governing the present England-Australia service.

Before the Tasman Sea can be crossed by air in anything resembling a commercial manner, large flying boats will be necessary. For the moment nothing really suitable is available, but Short's have something big on the stocks, and there is at least one large-scale boat under construction in the United States. Meanwhile, the eight additional Short boats ordered by Imperial's will be strengthened, so that the payload will probably be at least 5,000 lb. greater than that of the long-range boats. Delivery is expected in July or August.

Weather Broadcasts

SUNDRY changes of a minor nature have been made in the time-table of that very useful meteorological broadcast from Borough Hill. These changes, which consist of additional broadcasts of reports and warnings, are set out in the Air Ministry *Notice to Airmen*, No. 27, of this year.

D.C.3 Cruises at 207 m.p.h.

SOMETHING in the nature of a record for a large transport machine was lately announced by United Air Lines on the return to Chicago of one of its new-type Douglas D.C.3s from Dayton, Ohio, where their research pilot, Benny Howard (remembered for his astonishing performances at the National Air Races), conducted demonstration flights for the benefit of the U.S. Army Air Corps.

Howard recently flew this machine on a one-stop flight from Los Angeles to Chicago at heights between 12,000 and 17,000ft., following the installation of two of the latest type of Pratt and Whitney Twin Wasp radials. Using only 54 per cent. power the machine cruised at 207 m.p.h. at 13,000ft. The new feathering airscrews, by keeping down the revolutions, have brought about a 15 per cent. reduction in cabin noise. The single-engine ceiling is 11,500ft. While full details of the new Twin Wasps are not available, it is believed that they are more highly supercharged than previous commercial models.

Twenty-Four

WITH the addition of the Qantas boat *Coorong* (VH-ABE), which made its first service flight on March 2, Imperials have now a fleet of twenty-four boats available for the African and Eastern services, and this total does not include the two experimental boats *Cambria* and *Caledonia*, which are always at hand in case of emergency. Even now that the new eastern extension is being operated there are always six or seven boats at Hythe, five or six at the divisional bases of Alexandria, Kisumu, Durban, Karachi and Singapore and as many as a dozen in the air almost any day of the week.

The total weekly mileage flown by the Empire boats is 91,774 miles, and when the Air Mail Scheme is extended to Australia in the summer (and when one of the services now stopping at Karachi is extended to Singapore) the weekly mileage will be increased to 113,196.

The visit of *Centaurus* to Australia and New Zealand has aroused much interest and should help to overcome the present inertia in the matter of the trans-Tasman service.

Portugal in Africa

THE plans for the Department of Railways to develop internal air services in Portuguese East Africa materialised last year in the purchase of two Dragon Rapides, a Dragonfly and a Hornet Moth, a useful nucleus for a commercial fleet in a country where surface travel is slow and difficult and air transport must be economically exploited. Two more Rapides have since been ordered.

A Lourenço Marques-Johannesburg service started on December 17 after the two Rapides had been shipped out and assembled. Beyond that it is a little early to announce definite plans, but a 1,200-mile airline from Lourenço Marques, via Villa Joao Belo, Inhambane, Beira, Quelimane and Mozambique to Mampula has been approved, and although much work on aerodromes has yet to be done there is hope of a start this year. Lourenço Marques aerodrome has excellent approaches and is on the way to becoming a very fine field. Already it has the largest hangar in southern Africa—309ft. long, 100ft. wide and with only two internal columns. The Johannesburg service is operated twice weekly and will soon run thrice weekly. South African Airways are operating twice a week over the same route.

The Dragonfly was flown to Loanda last August by Mr. M. M. Rocha, the chief pilot, in order to demonstrate the advantages of a direct air line between Portugal's East and West African colonies. The route taken was via Vila Toxeiro, Vila Luzo, Silva Porto and Elizabethville. With him on this trip were Major Pina da Cunha, manager of the new organisation, and Dr. Ferreira de Fonseca, Portuguese Chargé d'Affaires.

Organised air transport in the Portuguese possessions in Africa has hitherto been limited to the R.A.N.A. service connecting the port of Beira with Salisbury and Blantyre and the French through service between Madagascar and the Belgian Congo, via Quelimane and Tete, which was pioneered by M. Réné Lefèvre and has now become an extension of the Air Afrique main line from the Mediterranean to the Congo River.

Commercial Aviation

THE THAMES AIRPORT PROJECT

A Combined Airport with Distinct Advantages : A Natural Marine Site : The Shipping Question.

By LINDSAY SHANKLAND.

DURING the last few weeks there have been a number of pronouncements concerning a projected Empire Airport. While people are talking freely on the subject, little progress has really been made in selecting a suitable location.

The chairman of the Southern Railway, is referring to the proposed site at Lullingstone, said that "an airport of international importance so close to the capital of the Empire is not a matter for private enterprise; the cost should be met in part by the State and in part by the county authorities." There can be no doubt that the Air Ministry shares this view, too, but the actual trouble seems to be not that it refuses to offer financial assistance, but that it intends to give every monetary encouragement *only* when a suitable site is agreed upon. The Langstone Harbour project has been rejected, and the Air Ministry has indicated that it will be much more interested in a proposal which can embrace both a flying-boat station and a land aerodrome.

Most people will agree that an Empire Airport ought to be situated really close to London, and that it must afford these adjacent facilities. On this basis the Thames site, briefly described in last week's issue, has much to recommend it. At the Lower Hope Reach, between Gravesend and Canvey Island, there is a length of the river which already offers itself as a natural marine aircraft harbour or base. On the Essex side and adjoining the river there are some three hundred acres of ground ready to be made into a first-class aerodrome.

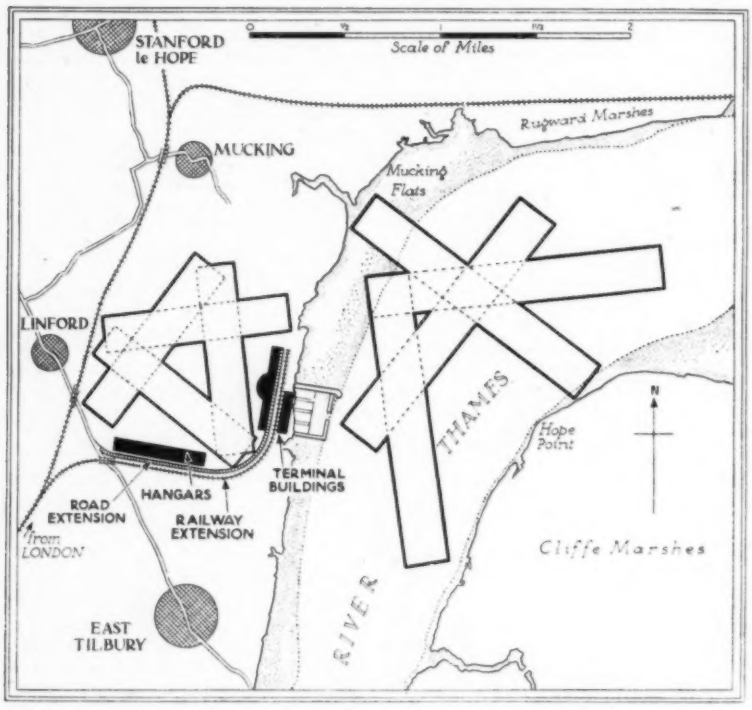
This land is close to Mucking village, and the L.M.S.R. have a line from Tilbury which runs immediately alongside the suggested site. This is important, because it is quite clear that terminal delay should be reduced to a minimum. It is proposed that a branch line should be constructed and the road from Muckingford will be extended in the same direction so that traffic will have easy access from the airport to the main London-Southend road.

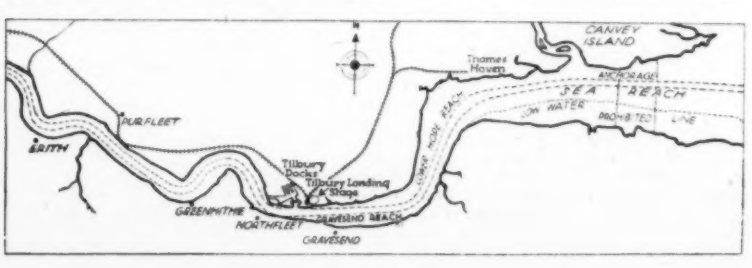
It is appropriate, therefore, to regard the site in its entirety. The area, combining both land and water, is unusually free of obstructions, and the only high ground in the neighbourhood is sufficiently far away as to be relatively unimportant. It is devoid of approach obstacles, and the weather conditions are very similar to those experienced at Gravesend. This section of the river does not suffer from the London dirt pall experienced on the upper reaches. Nevertheless, the site is very suitable for the safe operation of a blind approach system.

The proposed aerodrome site covers an area of some three hundred acres and is at present being used as a dumping ground for London's rubbish. The annual rate of filling is, at present, too slow, but it could be speeded up and the work of surfacing could then be started fairly soon. No great difficulty appears to present itself in the matter of drainage, and this can be economically carried out in cases where land has still to be filled. A number of mile-long concrete runways will be constructed, and according to the present plans the hangars are to be erected on the south side of the aerodrome, with the terminal building and railway station in the same block at the water's edge.

The possibilities of the marine base seem to be attractive. At Lower Hope the river affords natural facilities for take-offs and landings in every direction. Here, too, the Thames is comparatively sheltered. The prevailing wind is south-westerly and blows directly down the longest run of the river—a stretch of four miles. The shortest run at present available across the river and at low tide is at least one mile. This without dredging. If it is decided to develop the site it is more than likely that the port authorities will insist on some dredging for their own purposes.

No great difficulties should be met in the matter of shipping. At all times, according to the 1936 Air Navigation Act, the flying-boat is the "giving-way" vessel. When the visibility is really bad ships move very slowly, and the use of radio between ship, shore and aircraft will make co-operation possible. If, however, the blind approach system is applied, it is evident that some of the river traffic will be diverted along dredged channels close to the area known as Blyth Sand on the Kentish side, and on the Essex bank from Thameshaven down to Canvey. By such means it will be possible to provide an uninterrupted approach of nearly five miles. A point to remember, too, in the question of possible collision is that a ship, when moving on a river, is bound by the confines of a buoyed channel. There need be no misunderstanding caused by the use of two sets of approach beacons for the





Above the sketch-map which shows the Lower Hope Reach site in relation to London and the rest of the Thames estuary is a plan indicating the runway, building and communication system as these are at present envisaged. The "dry dock" will be seen behind the terminal block and the way in which the land and water runways are arranged in relation to each other is noteworthy.

COMMERCIAL AVIATION (CONTINUED)

different landing areas. Only one set is necessary, since the western and eastern lines of approach for landplanes and flying-boats are coincidental.

Adjacent to the administration and control buildings, it is intended to construct a partially covered-in dock. At high tide the flying-boats will move under their own power to one of the four bays where general maintenance and overhaul work can be carried out. The dock is to extend to the low-water line, where, it is suggested, a low wall will be built. The boat can then taxi through an opening with the wings well clear of any obstructions. The rise and fall of the tide at this part of the river is twelve feet. From the servicing point of view a distinct advantage is that the Short works are "across the road" at Rochester.

Lower Hope Reach appears to be the only suitable base between Harwich and Southampton. The land airport will take time to develop, but it is worth noting that, in the meantime, Gravesend could be utilised as a reserve.

It is not yet possible to obtain the exact cost of the project, but estimates already show that the scheme will be a far less costly affair than any hitherto suggested. The idea is certainly worthy of very serious consideration.

The Le Bourget Accident

ALL three members of the crew were unfortunately killed when the D.L.H. early morning mail machine flying between Cologne and Paris struck a hillock not far from Le Bourget aerodrome at 5 a.m. on February 22. Apparently the Ju.52 concerned had already flown over the airport, where visibility was extremely poor, and was either waiting for permission to come in on bearings, or was actually doing so when the accident occurred.

This Night Error

ONE or two interesting facts concerning the accuracy and otherwise of the modern direction-finder were given recently by Mr. H Busignes in an article in *Electrical Communication*.

He said that whereas night error on a frame aerial was as much as ±20 deg. at a range of 100 km., this error had been reduced with the use of Standard-Adcock equipment to ±2 deg. over twice this distance. The error over distances up to 100 km. could not be observed. Small variations occurred between 400 and 600 km., but when the critical distance had been passed the bearings became very constant and almost perfect stability was attained beyond 1,000 km., provided, of course that the transmitters were sufficiently powerful.

Misfortune

ONLY two days after the machine and its interesting equipment had been described in *Flight*, the special Air Travel and Survey Dragon was unfortunately wrecked at Croydon. Probably owing either to fuel failure or shortage, both engines cut out while the airport was being approached, and Capt. Philip Bailey, the pilot, was just unable to reach the landing area.

Capt. Bailey and his two companions, Capt. J. Furnival and Mr. T. Valette, both of the Marconi Company, were seriously injured. We hear that all three are now, to use the customary words in such a case, "fairly comfortable." The Dragon, it will be remembered, was fitted with a combined radio D/F receiver and automatic pilot, and was to have been used for air survey in Australia. The machine, it should be mentioned, was under manual control when the accident occurred.

All the Answers

LAST month a new air travel and transport enquiry bureau was opened at Bush House, Aldwych, W.C.2, by Wrightways, Ltd., the Croydon operators of Croydon. This company acts as agent for all air transport concerns, so that their position as enquirees should be a particularly valuable one. The bureau will be in charge of Mr. Cornish, who has had a long experience of the travel business.

This week Wrightways should be taking delivery of a second D.H.86B, which will be used for the company's freight and passenger service to Paris and also for Army co-operation work. Apparently the War Office finds that a comparatively large machine with four engines provides the searchlight and sound-detector operators with new experience, and is prepared to pay the necessarily larger flying charges.

A few weeks ago, incidentally, Wrightways' chief pilot, Mr. J. W. Duggan, encountered really serious icing conditions while approaching Le Bourget in the 86. Apparently something like two inches of clear ice formed on the leading edges and elsewhere, and he forthwith demanded Landing Turn Number One. This was duly given and a few moments later retracted. After a pause he was told that if he went up to 800 metres he would find warmer air. Up he went, and most of the ice thawed off. The question is: Why didn't the Le Bourget met. people—or for that matter the Croydon control—tell him about this inversion before his machine was loaded up to breaking point? As it was, the machine fell out of his hands at an air speed of nearly 90 m.p.h. even though a great deal of the ice had already disappeared.

Jersey—Portsmouth Again

THOSE who have had anything to do with internal air transport since the early days will remember that the first services operated by Jersey Airways started from Portsmouth, but during the last year or so, and until the operational centre was transferred to the new Jersey Airport, Southampton Airport has been the company's base. This year the Portsmouth-Jersey service has been reopened and the first machine, a D.H.86, left Portsmouth on February 28.

Although the fares between Southampton-Jersey have been raised, the company is now offering special week-end and mid-week fares. Last year, incidentally, Jersey Airways carried 33,300 passengers and something like 1,000,000 lb. of mail and freight, mainly between Southampton and the Island. In all, during the last four years, Jersey Airways have carried more than 110,000 passengers.

K.L.M.'s Super Electra

THE first K.L.M. Lockheed 14, or Super Electra, has been flown from the factory at Burbank, California, to Curaçao, the headquarters of the rapidly expanding and progressive "K.L.M. West Indies Company." This company has recently extended southwards and westwards into Venezuela and Colombia, as well as eastwards to Trinidad, and a service to Barbados will be opened as soon as ground facilities permit.

Cdr. Geisendorffer, one of the most senior of the K.L.M. pilots, flew the 14 from Burbank, the route followed to Curaçao being via El Paso Dallas, Atlanta, Jacksonville, Miami, Havana, and Port-au-Prince (Haiti).

The experience thus gained on the latter half of the route will be of value if the company ever opens a regular service between Curaçao and Miami. Such a line would mean that Curaçao would be within three days, or less, of New York.

The Super Electra, with its genuine cruising speed of over 220 m.p.h., will be used on certain European routes of the Royal Dutch Air Lines, one of which, as already suggested in *Flight*, may be that between Liverpool and Amsterdam.

Radio Guide

"Aircraft Radio," by D. Hay Surgeoner; 12s. 6d. Sir Isaac Pitman and Sons.

THE need for a comprehensive and reasonably up-to-date book on aircraft radio, which, at the same time is not written especially for the technicians, has always been a pressing one. The subject in general is covered with reasonable thoroughness in various books dealing with air navigation, but until the appearance of *Aircraft Radio* it has not been possible to find all the essential information in one volume.

There is nothing highbrow about this new book in Pitman's air transport series, and the radio expert is not likely to find it of real use except where certain little-understood items of equipment are concerned. But the pilot, the embryo operator and all those who are connected with air transport should be able to treat it, for the moment, at any rate, as a reference book for straightforward information.

This information does not merely cover radio equipment and its operation, but also the regulations which govern this operation, and the co-ordination of the different systems. The author opens with a brief history of the development of aircraft radio and concludes with a survey of airport lighting arrangements—which are closely connected with radio.

Curiously enough, at first glance *Aircraft Radio* does not appear to be very impressive or informative, and it is only after closer examination that the book's particular virtues of thoroughness and clarity become apparent. Probably the fact that the illustrations are not all of entirely up-to-date equipment gives one a wrong impression after merely casual inspection. The only other criticism which we have to offer concerns the appearance of a few minor typographical errors which, in one or two places, tend to convey a wrong impression. However, these are minor points. The book provides a very adequate survey of present-day radio equipment and operation.

PRIVATE FLYING

A striking impression of the Fairchild "24" in action. This machine is dealt with on pp. 230 and 231.

"Flight" photograph.

Topics of the Day

This Superiority

IT always seems to me that experienced pilots are often very bad examples to the novice, especially in the matter of cross-country methods. They fly from here to there without obvious preparation, sometimes without even opening a map, and usually without any attempt to make use of a C.D.C. or other navigational gadget.

The novice who travels with one of them may obtain quite wrong impressions of the whole business, and will, perhaps, rush away by himself on the first available opportunity and get himself hopelessly lost. The experienced pilot is much too fond of laughing aside the newcomer's energy and patience with track lines and calculators, yet for a start all this work with vector diagrams, and so forth, is absolutely essential.

Even the expert, when flying a new and much faster type, can, by promptly losing himself, provide a realistic example of the difficulties which are constantly met by the so often despised novice. His mind has become accustomed to guessing drift and approximate times of arrival on a basic ground speed of, perhaps, 110 or 120 m.p.h. Just as soon as he finds himself flying a machine with a cruising speed of, say, 180 m.p.h., all his guessing goes to pieces, and if the visibility is poor he will probably overshoot his destination.

After hundreds of hours of cross-country flying in all weathers it is certainly true to say that guessed corrections are at least as accurate as any that may be obtained from previous calculations, since the upper-air speed on which such calculations are based is very rarely correct. But without experience and practice any such guessing can be extremely wild. Only a week or two ago I was flying dual with a pilot who had done very little cross-country work, and on one occasion his estimated correction was less than 5 deg., whereas I knew quite well that this should have been at least 15 deg. Only continuous and meticulous work with a pencil and paper, or with a C.D.C., can possibly provide the novice with any foundations for assessments of this kind.

Useful Homework

WHEN I was first taught to fly across country my instructor not only made me draw with pencil and paper innumerable vector diagrams, but he also made me check them with care, and permitted the use of a C.D.C. only after the principle of the triangle of velocities had been thoroughly instilled. Furthermore, when giving me dual, he persistently asked at the most awkward moments whether I was on the right or left of my track, and which way corrections should be applied. Usually, what with engine noise and bump correction, my mind was a complete blank, and all I could do was to turn the machine slightly towards the track which I had left and look at the compass to see which way the needle had moved, and, consequently, which way the verge ring should be moved for the course change.

At the same time I was encouraged to amuse myself by planning long flights, which I certainly couldn't afford to carry out, in all manner of changing wind conditions. The direct result was that my guesses became reasonably accurate, and I suggest this sort of homework as an inexpensive and amusing method of becoming accustomed to the effect on different tracks of winds blowing from varying directions and at varying speeds.

There is a good psychological result, too, in all this homework. If, on the evening before the day on which a cross-country flight has been planned, the tracks are all drawn on the maps and the bearings measured, it is only necessary in the morning to ring up the Air Ministry or to listen to the 8.45 a.m. weather broadcast in order to apply the necessary corrections. Everything is then ready, and a start can be made with a feeling of considerable confidence.

Landmarks

AS for map reading, only actual practice in the air is of any real use, though a novice who is interested in maps and who always examines the country in the vicinity of his track lines before starting off is far less likely to miss those landmarks which are really important.

At least half the trouble with beginners is that they waste their time and nervous energy in examining practically everything that passes underneath. In due time they discover that, generally speaking, only railways, larger towns and stretches of water are of any real value. Advance calculation of the approximate time at which any really distinctive and monumental landmark is due to be passed is worth more than all the casual scrutiny which can possibly be carried out.

If the selected landmark does not appear at the right moment, then, knowing the approximate ground speed, one's position can only be somewhere on a short radius having its centre at the last checking point. A moment's examination of the area concerned—viewed, of course, from the angle at which it is being approached—will show that, say, only one arrangement of railway lines can possibly be that at which one is looking.

Another useful point is to notice that a particular railway line or river must sooner or later be crossed unless one has set off in an absurdly incorrect direction. Suitable landmarks of this kind can be previously marked on the map, so that along the track there are a number of what are sometimes called "bags," out of which it is impossible to fly by accident unless one is quite blind or fast asleep. Such continuous and unmistakable landmarks as the Manchester Ship Canal, the Thames Estuary or the open sea are outstanding examples, but there is no need for them to be quite so obvious. An arrangement of railway lines is quite sufficient, and if the line is crossed at some momentarily unrecognisable point then one can fly up and down the "fence" until one's position is finally verified.

INDICATOR.

FROM the CLUBS and SCHOOLS

LONDON

DURING last week the London Aeroplane Club's flying times at Hatfield totalled 77 hours. Mr. F. R. Parker completed the test for his "A" licence, and two new members joined.

NEWCASTLE-ON-TYNE

Although high winds prevented flying on four days of last week, Mr. P. S. Taylor managed to make his first solo, and the flying total for the week was 24 hours 50 minutes. Eighteen machines visited Woolsington.

C.A.S.C.

Including a cross-country flight by four members to Hanworth for the dawn patrol last Sunday, a total of 16 hr. 20 min. were put in at Cambridge last Sunday by the Civil Aviation Service Corps. Needless to say, this comparatively high figure was made possible by the fine weather and lengthening days. Two pupils made qualifying flights for probationary membership.

KARACHI

Concentrating on the training of "A" and "B" licence pilots has given satisfactory results, and Messrs. Khosla, Varma, and Abdul Rehman have obtained their "A" licences, whilst Mr. Malik has received his "B" licence, and Mr. Rao holds a ground engineer's "A" licence. Cross-country flights were carried out to several aerodromes, and, of the total flying for January of 188 hr. 45 min., 81 hr. 30 min. represented cross-countries.

CINQUE PORTS

During the past week the flying times amounted to 58 hours, and Messrs. W. Halford and D. Taylor flew their "A" licence tests. The first fine week-end of the year made a great difference to the activities, and over 24 hours were recorded on Saturday and Sunday. The Army Co-operation season being in full swing, the Club was kept busy on practically every night last week, and, in addition, Mrs. Morris Davies took dual on two consecutive nights on the suitably equipped Moth.

BOURNEMOUTH

Sideslips were barred in the landing competition held on Sunday at Christchurch, and this was won by Mr. F. Sparrow—a particularly good performance since, at the time, he had not made his first solo. Four new members joined the Bournemouth Flying Club during last week, and the names of two add to the steadily growing ornithological collection—which includes a Heron, a Martin, a Swallow, a Robin, three Sparrows, and three Avis's. Last week's flying total was 31 hours 15 minutes.

HAMPSHIRE

During the month of February a total of 113 hr. 10 min. was put in by the Hampshire Aeroplane Club, and Mr. Clive Bayley qualified for his "A" licence last week, during which the flying total was 57 hr. 30 min. As already recorded in last week's report of the Club's annual dinner, the "R. J. Burens" Safe Flying Trophy was won by Mr. G. B. Miller, and the "Frank Wallis" Blind Flying Trophy was won by Mr. M. R. Ingle-Finch. Two members started "A" licence courses last week.

NORTHERN INDIA

Originally formed in 1933, the Northern India Flying Club, of Lahore, had its most successful year in 1937, when a total of 1,013 hours were flown; of this total a very large part was made up in cross-country flights. Twelve pilots were trained during the year by the club. At the end of last month a very successful flying display was staged and this was supported by members both of the Delhi Flying Club and of the Aeronautical Training Centre. Following a formation fly past by Club machines and by the R.A.F., and an aerobatic display, the final of the landing competition was flown off. This was won by Mr. J. S. Sighal of the club. There were the usual humorous items and the afternoon closed with an obstacle race.

MADRAS

Yet another flight to Cochin was made by a Madras Club machine during January, when Mr. Stevens, with an instructor, flew there in a Gipsy Moth. The day after their arrival they flew to Alleppey and elsewhere along the West Coast, and on the following day the instructor brought the machine back by himself to Madras. Another important flight by a member in a Club machine was made by Mr. Triou to Trivandrum and back. On the last Sunday of the month seventeen pilots entered the bombing competition for which Messrs. Lomax and Barthasarathy tied for first place with the maximum score; on replay from a greater height Mr. Lomax proved the winner. Incidentally, the previous winner, Mr. Law, was forced by the handicappers to drop his bombs from 600ft. instead of 400ft., and his name did not appear among those of the successful pilots. Altogether twelve competitors each scored twenty-five or more marks out of the maximum of thirty.

PENANG

On the last day of January the Penang Flying Club suffered a serious loss in the tragic death of the Hon. Maj. E. Newbold, O.B.E., who was one of the Club's founders and its first president.

The flying times for January, including joy-riding and tests, totalled 116 hr. 30 min.—nearly 50 hr. behind that for the same month last year. It is hoped that the forthcoming rally and free instruction which is being given by a local sports club will help to swell membership. On January 16 a flight of Audax machines of the Straits Settlements V.F.A. arrived in the course of a training flight. Other visitors were a couple of Fairey Swordfish from H.M.S. *Eagle*, and the Viceroy of India's Avro 642 which carried Air Marshal Joubert de la Ferté on his way to Singapore.

REDHILL

The Redhill Club's flying times for the week ended March 4 amounted to 36 hr. 50 min. Cross-countries included trips to Castle Bromwich for the B.I.F., and to Witney. Four new flying members have joined.

BEDFORD

With the fine weather flying hours have increased at Barton. Two machines went to Hanworth for the dawn patrol last Sunday, and one managed to enter the zone unobserved. There were five new members.

BENGAL

During January two competitions were held for practice. A spot-landing competition was won by Mr. A. B. Guha, and a balloon bursting competition by Mr. E. Phillips. Formation flying was practised during the latter part of the month. Several cross-country flights were made and flying for January totalled just over 100 hours.

STRATHTAY

Gales again seriously interfered with flying during the last week of February, only 10 hours being recorded. The month's total was 41 hours. Mr. S. Carmichael has made his first solo. As the result of good work by "Bill" Proctor, the club is now able to take part in Sunday's Border Raid.

YORKSHIRE

The flying times for February were 100 per cent. better than the same month last year, the total being 85 hr. 40 min. The weather, apart from high winds, has been excellent, and the Yorkshire Aeroplane Club hopes that favourable conditions will prevail for the opening of the joyriding season at Yeadon, when the Scion will take the air again after the completion of its C. of A.

HYDERABAD

A great increase in the number of flying hours during January, the total of which is 137 hr. 10 min., is accounted for by the number of cross-country flights made. The club membership has now reached a total of 67. An interesting visitor was in the shape of the Lockheed 12 belonging to H.H. the Maharaja of Kashmir.

BORDER

Strong winds, usually reaching gale force, prevented flying on most days during last week, and, in fact, flying has only been possible on two days. Notwithstanding this, 11 hr. 5 min. were flown, and cross-country flights were made to Renfrew, Perth, Aberdeen, Edinburgh, Newcastle and Usworth.

HANWORTH

Thirty machines visited Hanworth for the dawn patrol last Sunday and, of these, five pilots qualified for free breakfasts. On the same day members flew over to Brooklands for lunch, and the luncheon patrol idea will be repeated at Reading next Sunday. A bombing competition will be held at Aldenham Aerodrome on March 27. A total of 71 hours was flown by the Club during the week, and three new members joined.

MARSHALL'S

Last Sunday was the busiest day so far experienced at the new Cambridge aerodrome, and the flying total for the whole of last week was two hours short of the century. Mr. Barge made his first solo flight, and the recent fine weather caused a number of members to emerge from their hibernation. Three new members joined the school.

BROOKLANDS

With seven machines in the air, a total of 45 hours was put in by the Brooklands Club last Sunday, and the total for the entire week was a matter of 150 hours. Capt. Crawford, of the Royal Engineers, and Mr. H. Gluckstein made first solos. The previously mentioned seven machines were also up and about for the Hanworth dawn patrol, and one, flown by Mr. Marwick, got through. The Hanworth Club also paid a welcome luncheon visit. Meanwhile, the chief ground instructor, Mr. Robert Ashton, has been very busy with twelve candidates for navigators' licences, three of whom are attempting their First Class examinations. The third of the series of handicap forced landing competitions will be flown off next Sunday.

Turkey and Finland Now

THE Royal Aero Club has exchanged guarantees with Turkey and Finland, and the Carnet de Passage en Douane may now be used in these countries.

General Post

IF there is one importantly pleasant feature of the General Aircraft staff dances it is that the greater and smaller powers-that-be turn up in force and take a serious part in the proceedings. There is none of this business of "popping in to see the staff at play" and gazing momentarily on the frivolities with a superior air.

Last Friday evening's star turn was the mysterious gentleman—one Robert Harbin, produced at no cost to the firm or the staff by Mr. Castlemaine—who apparently remembered all the words at the top of all the pages in the London telephone directory and who could produce anything from almost anywhere. A friend of ours knows the directory trick, but that does not make the feat any less surprising.

PRIVATE FLYING (CONTINUED)

"*Flight*" photograph

THIS YEAR'S "24"

Some Flying Impressions of the Latest Fairchild—Now Available as a Full Four-seater with Either Warner or Ranger Engine

FLYING costs and conditions are so very different in America that it is customary to treat their luxury private-owner types almost as one would treat small transport aeroplanes. Whereas the difference in running costs between a 100 h.p. and, say, a 300 h.p. machine is comparatively small in that country, such costs are of considerable importance over here, and very few enthusiastic people are in a position to afford the advantages which unlimited power can provide in the way of equipment and roomy comfort.

Among American cabin machines the Fairchild 24 is one of the few which are comparable in size and power with the light aeroplanes which have been developed in this country. Nevertheless, the interior arrangements of the latest version are on lines to which we have become accustomed in machines from the other side of the Atlantic—and, regrettably enough, to which we are far from being accustomed in this country. Where the young and enthusiastic aeronaut is concerned the general appearance of the outside and, particularly, of the inside of a machine is not very important, but it is impossible to overestimate the value of familiar furnishings and fittings, designed to give an appearance of immense solidity, when one is attempting to interest the newcomer.

To a very large extent the Fairchild 24 makes the best of both worlds. Although flying only on 165 h.p.—in the case of the Ranger version—the compromise in favour of comfort has not been made at too great an expense in cruising speed.

It is idle, of course, to pretend that any particular American aeroplane is more perfect than a typical English one—in fact, the average "ship" has flying characteristics which are distinctly peculiar to English hands and feet—but some of these visitors certainly tend to give one ideas above one's station. The wide car-type seats, the solid-looking control arrangements, the superior finish and the very complete standard equipment should always (but rarely does) provide salutory ideas for our own manufacturers. In the case of the Fairchild the standard equipment includes an electric starter, navigation lights, fire extinguisher and, interestingly enough, a built-in first-aid kit, while amongst approved accessories which the machine has been designed to take are such items as two-way radio, landing lights and all the mass of special instruments which, for ordinary flying, are amusing rather than essential.

Although the word "visitor" applies to the Fairchild, Mr. Antoine Gazda, who has been empowered by the company to arrange for its distribution in this country, is looking out for a possible manufacturer over here. In its imported form the cost of the De luxe model is not likely to be very much less than £1,900 or £2,000, but the suggestion is that if some firm could be encouraged to make the machine over here the price would be in the region of £1,400—which is reasonable enough when its performance, capacity and equipment are taken into consideration.

As a flying machine the new "24" is not very different from that dealt with in *Flight* of September 2, 1937, but the controls are rather lighter and smoother, the cabin is roomier, the finish is better and, most important of all, the payload has been increased so that the machine may be treated as a full four-seater with either the 165 h.p. in-line Ranger Six or the radial Warner Super-Scarab. The one which I flew is fitted with the Ranger, which, though not permitting quite so large a payload as that in the case of a machine fitted with the Warner, is likely to find greater favour, particularly as this engine has been designed for really hard wear rather than for maximum efficiency in terms of power-weight ratio. It is interesting to surmise what the machine's performance and characteristics would be like if it could be fitted, for instance, with a Gipsy Six.

Without Attention

In common with the best American private-owner types, the Fairchild's most outstanding feature from the pilot's point of view is its rigid stability in all axes, and it is probably fair to say that it requires less attention in the air than any British light aeroplane. It will fly and turn accurately on either the ailerons or the rudder, though the effect is more accurate in the latter case when the machine is trimmed to a climbing attitude. The stall with the flaps either up or down is harmless enough.

For the best results a rather special take-off technique is applied. During the initial part of the run the stick is left in the neutral position with tail just clear of the ground, and this is lifted only a few seconds before the moment when the machine is airborne. Once one is off the ground the machine can be held firmly in the air, and it is neither necessary nor advisable to attempt to level off in order to gain speed. Again, for better results, the take-off is made with the flaps in the half-down position.

Remembering its innocuous stall, the approach can be made, if necessary, very slowly indeed, and the flaps, even when fully down, are not so potent that the hold-off period, even at a gliding speed of 55 m.p.h., is dangerously shortened. These flaps, however, are very effective at somewhat higher speeds and in case of emergency, or if there was any doubt about

one's ability to reach a particular field during a forced landing, the nose can actually be pointed at the boundary while the speed, at anything less than a sheer diving angle, does not increase above 80 m.p.h. This excess speed can be quickly removed at the last moment with full rudder and a sufficient amount of opposite aileron to prevent the machine from turning. A strong capacity for accurate sideslipping is one which is rather missed in some of the more modern high-efficiency types. The Fairchild sideslips strongly with the flaps either up or down. These flaps are directly operated by means of a lever between the two front seats. Incidentally, at the speeds above 75 m.p.h. the airflow past the flaps can be heard, and this whistling noise might sometimes be useful as an aural guide to approach speed.

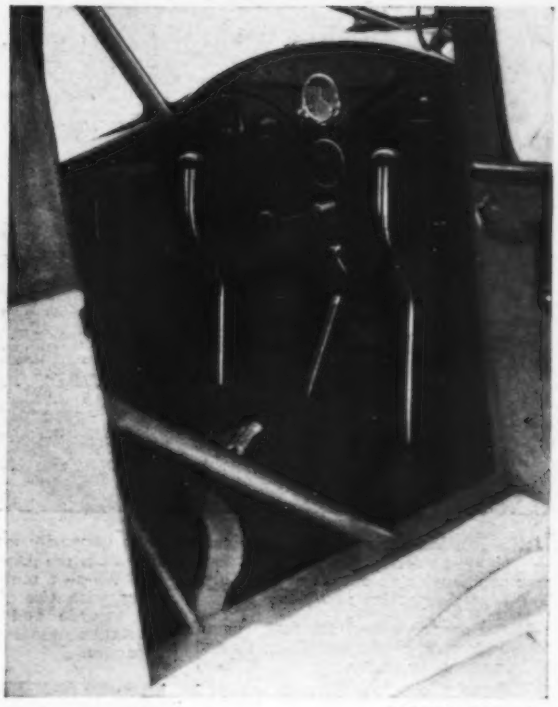
The cabin is as quiet as one can expect in a single-engined machine, and entry does not demand gymnastics or contortions. When the side windows are open there is no draught except when the speed is very low. My only complaints concern the view to the rear, which is non-existent (though not altogether necessary with efficient differentially acting brakes), the position of the trimming crank in the roof, and the arrangement of the pedal-operated brakes. No doubt one soon becomes accustomed to the trimming crank movement, and sufficiently well trained in the feet and legs to be able to operate the brake pedals with accuracy. Nevertheless, as a purely personal opinion, I think that all pedal operation for brakes should be abolished. There are two wing tanks and the gauge and control system for these is very simple, with two gauges on each side of the cabin at the wing roots and two plain on-off taps beside them. One can either fly on both tanks, or on one at a time, depending on whether fuel consumption is a matter of importance.

On the face of it there is nothing really outstanding about the Fairchild 24, except a degree of comfort to which we are certainly not accustomed over here, but the machine is an excellent example of pure compromise. It is extremely easy and safe to fly, it carries four people and their luggage, and its cruising speed on the matter of 165 h.p. is quite as high as that required by the private owner. INDICATOR.

THE DE LUXE FAIRCHILD "24"
165 h.p. Six-cylinder Ranger Engine

Span	36ft. 4in.
Length	24ft. 10in.
Weight, empty	1,561 lb.
All-up weight	2,550 lb.
Cruising speed (optimum altitude)	132 m.p.h.
Landing speed	47 m.p.h.
Rate of climb	730ft./min.
Cruising range	560 miles

Enquiries to: Mr. Antoine Gazda, Dorchester Hotel, London, W.1.



"Flight" photograph

Inside the Fairchild's cabin. The general layout is arranged on lines comforting to the car owner and the dashboard scheme is worthy of note. The flap lever is in the centre.

The way in which the fuselage shape is "humped" to provide head-room may be seen in this view of the machine.

"Flight" photograph

Comet to Try Again

FLYING OFFICER A. E. CLOUSTON and Mr. Victor Ricketts are shortly making a new London-Antipodes bid in the D.H. Comet *Australia Anniversary*. Their first effort, a few weeks ago, ended with a damaged undercarriage in Turkey.

Incidentally, some stout salvage work was done after the mishap. Alex Henshaw flew out Mr. Cross, of Essex Aero, Ltd., and a welder, London, complete with spares and equipment, in a Vega Gull. With the co-operation of the local public works department, both halves of the undercarriage were repaired, Henshaw and Ricketts also flew over to Alexandria and collected a new airscrew and tyre, and F/O. Clouston was soon able to fly the Comet home.

Civil Aviation Information Bureau

ADVICE upon any matter concerning civil aviation is available at the newly opened information bureau of the Air Ministry Department of Civil Aviation, Ariel House, Strand, London, W.C.2. Callers, writers or telephone enquirers (telephone, Temple Bar 3553; telegrams, "Airquest, Estrand, London") may obtain information on, *inter alia*:—

Air travel; British and foreign air services at home and abroad; civil aerodromes, clubs and schools in this country; charter and taxi services; weather conditions; and aerial survey, photography and advertising work.

The bureau is open from 9 a.m. to 8 p.m. every weekday, including Saturday.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

A CLIPPER SEES DAYLIGHT: Out of its massive "cocoon" of scaffolding, the hull of the first of six Boeing 314 trans-oceanic flying boats is now on the slipway at Seattle. The special beaching gear is eight-wheeled and weighs fifteen tons.

THE Russian engineer Mikulin is said to have developed a successful new aero engine with an output of 1,200 h.p. The type designation is AM-40.

Miss Dorothy Spicer, the first woman to hold ground engineers' A, B, C, and D licences, is to marry Flt. Lt. Richard Pearse, of the Civil Aviation Department, Air Ministry.

An association under the name of the "National Flying Corporation" has been formed with its head office at 7, Sharia Fuad 1st, Cairo, Egypt. Its object is, briefly, to disseminate "air-mindedness."

Congratulations to Mr. Cyril Peckham, formerly of Phillips and Powis, Ltd., on winning the 25-gn. prize offered by the Air League for an Empire Air-Day poster. A close runner-up was Mr. R. Glasby, of Bridlington.

After about twenty years of litigation the U.S. Supreme Court has upheld Robert Esnault-Pelterie in a suit against the U.S. Government in respect of the use of "joystick" controls. Damages, it is reported, may total as much as a million dollars.

According to a report by the Controller of Civil Aviation in the Department of Transport, Canada had 41 air mail routes operating during the third quarter of 1937.

At the same period, there were 640 private pilots, 360 commercial pilots, 121 "limited" commercial pilots and 64 "transport" pilots in active service, together with 566 ground engineers. There were 100 private and 469 commercial aeroplanes.

An unusually interesting new military aircraft is the American Hall-Aluminium XPTBH-2—a mid-wing twin-float monoplane with two Twin Wasps, intended for torpedo and bomb dropping and coastal reconnaissance. The span is 79ft. 4in.

Mists last Monday prevented a height test of the improved D.H. Albatross in which Captain O. P. Jones, of Imperial Airways, was to share. On previous flights the machine has reached 20,000ft. The cruising speed is expected to be about 210 m.p.h.

AERO-ENGINED: Capable, it is said, of over 50 m.p.h., the "H. 16" hydroglider, designed by Mr. W. F. W. Davies—an expert on these shallow-water craft—has a Birmabright hull and a Cirrus Minor engine with special crankshaft extension to carry the cooling fan and starting dog. The "H. 16" draws only 3in. of water, cruising at 30 m.p.h. with "pilot" and three passengers.

Forthcoming Events

March 10. R.Ae.S. Portsmouth Branch Lecture; "Air Raid Precautions," by Sgt. Barnes.
March 11. Cinque Ports Flying Club: Annual Dinner and Dance, Grand Hotel, Folkestone.
March 22. R.Ae.S. Isle of Wight Branch Lecture: "Air Route and Aerodrome Control," by Capt. P. W. Lynche-Blosse.
March 23. R.Ae.C.: Annual General Meeting, 6.30 p.m., 119, Piccadilly, London, W.1.
March 24. R.Ae.S. Portsmouth Branch Lecture: "Refuelling in the Air," by Sir Alan Cobham.
March 25. Portsmouth Aero Club: Annual Ball, Pavilion Ballroom, Southsea.
March 25. Norfolk and Norwich Aero Club: Annual Dinner, Municipal Airport, Norwich.
April 1. Bristol and Wessex Aeroplane Club, Ltd.: Annual Dance, Victoria Rooms, Clifton.
April 5. R.Ae.S. Isle of Wight Branch Lecture: "Large Aeroplanes," by Dr. H. Roxbee-Cox.
April 6. Aero Golfing Society: Instone Trophy, Hadley Wood.
April 7. R.Ae.S. Lecture*: "The Manipulation of the Boundary Layer," by Mr. E. G. Richardson.
April 12. R.Ae.S. Isle of Wight Branch Lecture: "Tool Design and Manufacture," by Mr. L. Leech.
April 21. R.Ae.S. Lecture*: "High Altitude Flying," by Prof. A. E. Younger.
April 28. R.Ae.S. Lecture*: "Factors Controlling the Development of Electrical Ignition on Aero Engines," by Dr. G. E. Bairsto.
April 30. Aero Golfing Society: R.A.F. Match, Felixstowe.
May 14-22. Finnish Aero Show, Helsinki.
May 17. Air League of the British Empire: Annual Dinner, Grosvenor House, London.

* All these lectures take place at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1, beginning at 6.30 p.m.

The Mont Blanc *massif* from the air.

PASSENGER to the PLAYGROUNDS

Some Random Musings on an Airline Trip from London to Geneva for Winter Sports

By CAPTAIN NORMAN MACMILLAN, M.C., A.F.C., A.F.R.Ae.S., F.R.S.A.

ONE day, a few weeks back, the south of England awoke to the drumming of a seventy-miles-an-hour gale. The wind bent the ilex trees outside my window, drove cloud-rack low across the sky. It looked a bumpy day for flying.

I reached Croydon airport booking hall at eight-forty-five. Why are passengers arriving from London left to hang about in the booking hall? It always reminds me of the tomb of the Spanish Kings in the Escorial on the Guadarrama Mountains—shorn certainly of its lavish dignity, but with the same sepulchral air. There ought to be a comfortable waiting room, with windows looking out over the aerodrome, where the prospective passenger (and his friends) can see something more than a row of booking offices.

Nine o'clock. Bending forward against the blast of the gale, we crossed the concrete apron to the Wibault, standing with her three engines ticking over.

Settled in our seats, I fastened my lap strap. As we taxied out the steward came down the cabin and fastened the straps of those passengers who evidently did not realise their value. At the north-east corner of the concrete apron we got the signal to take off.

The run was longer than usual, doubtless owing to the flow of air pouring down the rise ahead of us.

Once off the ground the bumps began. The left wing dropped. We yawed to the right. Came the familiar sudden drop, followed by the upward punch. Then we skimmed low above the trees at a fast forward speed. Evidently the pilot was disinclined to pull up steeply under the conditions we had to face. No experienced pilot would.

It was a bumpy ride to the coast. Alternately the Wibault wagged her tail and rolled. Personally, I always think that yawing is the most uncomfortable motion because of the shuddering that accompanies it.

Near Hastings we climbed through the clouds. At 5,000 feet we were well above the stormy nimbus and cumulo-stratus. Through occasional gaps we saw wave-battered ships creeping down Channel into the teeth of the madcap wind.

Free of the bumps, the passengers settled down to read or to complete the sleep broken by an early morning call.

Above Le Treport I looked down upon the big building that stands on the hill outside the town. During the Great War it was a general hospital. I recalled how pleasant it was to lie there between cool white sheets after a particularly vicious spell near the La Bassée Canal.

The flight between the French coast and Paris always bores me, and I was not sorry when we pulled to a standstill at Le Bourgêt aerodrome 1 hour 43 minutes after taxying out at Croydon—good going through the storm.

Within twenty minutes we had cleared passports, had a warm drink at the bar in the waiting-room, and were seated in the Potez 621 that was to carry us on to Lyons.

It was the first time I had been in this model Potez. She was a nice little aeroplane, with two six-seater cabins divided by an open bulkhead. Seats were comfortable, and the downward view extremely good except where interfered with by the engines. Driven by two 700 h.p. outrigger-mounted Hispano-Suiza engines, the Potez cruised at an indicated speed of 210 kilometres an hour. She was quite remarkably stable in flight. On this occasion the air conditions were really rough as we left Paris; the stability of the Potez on all three axes, apparently, made her more susceptible to vertical movements on a level keel. As we

climbed up into and through the clouds over Paris, with the winding Seine on the right and the Marne on the left, a succession of these vertical deflections upset several of the passengers. Some had come from London in the Wibault, when I thought the roughness of the passage was much worse. Then no one had been sick. The explanation must lie in one of three things. One, because the Potez is a high-wing monoplane, from whose cabin passengers can look almost straight down to earth without that reassuring surface that is characteristic of the low-wing monoplane. Two, because we were climbing higher; for, to escape the head wind and get above the bumps, our pilot climbed steadily to an altitude of 13,500 feet. There we just skimmed the tops of the great cumulus clouds, whose ill-defined upper fringes occasionally writhed about our wings like puffs of smoke from a cigarette. Three, because of the vertical accelerations; the Wibault had rolled and yawed.

We saw little of the ground until we reached the valley of the river Saône, where we crossed the ridge of hills and glided down.

The country north of Lyons can be sticky in bad weather. To the east rises the Alpine mountain mass; to the west, around Macon, rises a ridge of hills which is frequently shrouded in clouds.

When the weather is not too good, pilots leaving Paris for Lyons generally steer east of the direct line, pick up the Saône well north of Macon, then fly down the valley to Lyons.

Circular City

As we glided down the valley in and out of the clouds towards the attractive-looking, almost circular city of Macon, one could see the cloud-base right down on the western hills. Near this area the ill-fated Empire flying-boat *Capricornus* crashed into a hillside when flying blind.

Lyons came into view; there the dirty-brown Rhône runs into the Saône. A moment later we made a smooth landing on Bron aerodrome.

The Potez refuelled and left for Marignane-Marseilles. The Geneva 'plane landed soon afterwards—a little Fokker F.VIIb—and bounced up to the tarmac on its springy undercarriage.

While the Fokker was being refuelled and checked over, I had time for a large hunk of French bread and ham by way of lunch. And then, forty-eight minutes after the Potez had come to rest, the Fokker was under way.

The short ground run recalled the days when it was even more necessary to be strapped into the seat when taxying than when flying.

The metal airscrews whanged like buzz-saws cutting timber as we climbed steeply off the aerodrome and headed towards the east. Ahead, clouds and mountains formed a fantastic skyline where solid and vapour were alike indistinguishable.

On the maps which are provided in the aeroplane for the convenience of those passengers who can read them from the air, I noticed that the direct route from Lyons to Geneva went straight over the tops of the hills; but an alternative route followed the windings of the Rhône. Both routes were marked equally prominently. This made it clear that when the weather was really bad one did a valley crawl from aerodrome to aerodrome.

But that day we flew the straight course. The hills became steeper, the Rhône swung away to the right and vanished in a cleft among the mountains, and we disappeared into a cloud. A few seconds later we emerged some 1,500 feet above the firs that rose like Christmas-trees from the white snow that swathed a hill-top.

To the right, some distance away, I saw the Lac du Bourgêt, lying in a deep valley. Soon the Rhône wound underneath us again, and ahead I saw the narrow gorge that it pierces as it flows from the valley in which Geneva stands.

Passing in and out of clouds, we crossed the last range of hills and then power-glided towards Geneva aerodrome. Ahead, the Lac Léman spread tranquil waters in a long, narrow sheet. Below rose the huge buildings of the League of Nations. We came to a standstill on Geneva aerodrome 38 minutes after leaving Lyons, and less than six hours after leaving Croydon.

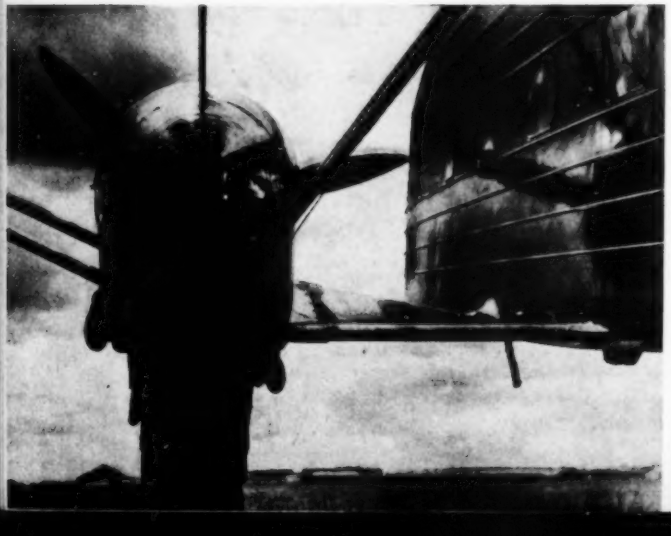
* * *

Transport from aerodrome to city was provided by Swissair coach. From Geneva to Villars (my destination) the route is by train and motor car. The railway track runs over a section of the Simplon route. Aigle is the station for Villars.

At Villars the final of the Air France Ski Cup and the International University Ski Championships were run next day and won by a Swiss with a Britisher second.

What need to describe the winter sports to those who have been? And why make envious those who have not?

(Right) The airport building at Bron (Lyons). (Below) An unusual angle on the Potez 621 (two 700 h.p. Hispanos) used on the Paris-Lyons run.



The sun shone gloriously at Villars the morning we were due to leave, tipping the upper heights of the Dent du Midi with platinum and diamonds. The Villars Palace Hotel bus climbed a short rise over the frozen snow, stuck, had to be run back again and given a flying start with human aid. Once round the first corner the driver managed to keep going, and soon we began the long descent to Aigle. Astonishingly the Swiss drivers manœuvre their vehicles over snow and icebound roads. At times they traverse narrow bridges over deep ravines where a skid might mean a fall of several hundred feet. It is the old tag of familiarity breeding contempt. Near the bottom of the valley we ran into fog.

We had a pleasant second breakfast in the electric train between Aigle and Geneva. This modern train, with aluminium coachwork, was beautifully hygienic.

Along the wide curving shore of the Lac Léman the fog grew thicker. Thousands of wild duck paddled out from the shore as we passed. The Castle of Chillon disappeared in the mist.

In Geneva the weather was still thicker. At the aerodrome a thick, damp fog gave a visibility of about 50 yards on the ground. But we were quickly told that the Fokker would leave as soon as we were on board.

The same pilot was flying. Jack Bamford, London manager for Air France, introduced us. Chief Pilot René

The two six-seater cabins of an Air France Potex 621.

Charpentier, one of the old-time pilots of the line, was well known at Croydon in the early days; for the past ten years or so he has piloted the Lyons-Geneva run, learning every trick of the mountain trip between France and Switzerland. And that is the soundest method of guaranteeing the safety of an air route over a difficult hop. The addition of blind-flying instruments in recent years is, of course, a tremendous benefit to the pilot, for it enables him to operate with still greater regularity.

* * *

The Fokker eight-seater was full. Quickly the engines were started. We taxied out from the hangar near the end of the aerodrome, and turned to face the Lac Léman. Had we headed the other way we should have been facing the ridge of hills and the narrow gorge through which the Rhône passes. But with the long lake valley ahead there was ample room to climb above the fog Just to our left rose the considerable range that runs parallel with the lake.

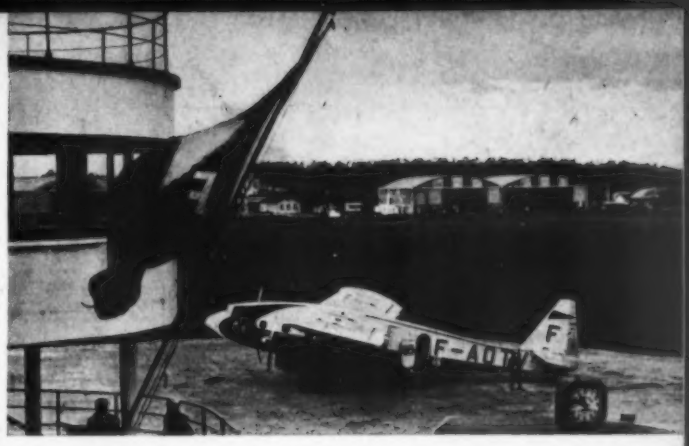
As we bounded along the ground on the springy undercarriage we drove into a grey mist. Soon the bouncing ceased, and we were in the air with nothing visible around us, and the greyness, if anything, gloomier.

At irregular intervals the three metal airscrews passed in and out of phase with a drumming whine.

Steadily we climbed. The minutes passed and the greyness seemed not to lighten, but at length we emerged from the bank of fog which spread unbroken down the valley at a height of about 4,000 feet. We could not see the lake, but the mountains rose proudly from the blinding cloud layer in a curiously false perspective that reminded me of Chinese pictures.

Ahead rose the tooth-like edge of the Dent du Midi; away to the right, the bulk of Mont Blanc. Then, 500 feet above the cloud, we turned on to our course for Lyons.

At 7,000 feet we crossed low above the main ridge that lay between us and our destination, and saw little huts almost buried in the snowdrifts. Ahead, over French territory, we saw the sweeping wings of a military monoplane, an Amiot 142, which had climbed through the clouds from Bron.



The Potez at Lyons airport.

Soon we were gliding down through broken cloud, one layer after another, until at 800 feet we were below all the cloud and gliding down to land.

In a few minutes the Potez 621 came in from Marseilles. Mechanics began to refuel her, and her chief pilot, Gaspard Engelbart, another long-service pilot of Air France, came into the restaurant and joined us.

We took our places, eleven up in a twelve-passenger machine, with no steward, because of the weight we carried. Soon we were above the lower layer of cloud, climbing at 2,000 and 1,950 r.p.m.; the next layer was thicker, and we flew blind in bumps; two and a half minutes later we came out above the clouds. Away to the right Mont Blanc trailed a wisp of vapour about its shoulders, like a woman with a tulle scarf.

At 4,000 feet we levelled out for the run to Paris. The engines turned steadily at 2,150 r.p.m. I went forward to the back of the pilot's cockpit, looked at the instruments and out through the windows at the lovely stretch of country spread below the broken clouds. We were flying with a Pioneer gyro automatic pilot. There was no need for either the first or second pilot to touch the controls. If it was necessary to alter course slightly, it could be done on the rudder only as we droned through space.

Soon the message came through that there was fog near Le Bourget, with 50 metres between the ground and the lower layer of fog. As we approached the Marne I saw the upper half of the Eiffel Tower above the fog which hid the city.

Le Bourget Again

A wide, left-hand turn brought us through the fog. We skimmed the ground with a bit of engine, shot over the aerodrome boundary and landed.

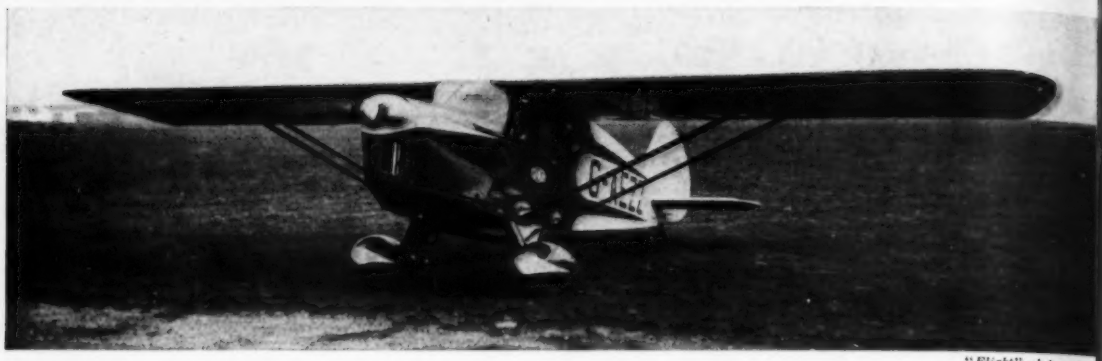
We had just time to clear the passport office and enter the restaurant for a mere five minutes before boarding the Wibault for Croydon. Followed an uneventful run with nine passengers in the ten-seater 'plane and a crew of three, including a steward.

The trip was made just above the layer of broken cloud, at a height of 1,600ft., and with all three engines running at 1,900 r.p.m.

* * *

If there is any criticism to make of air travel on this route it is certainly not of the efficiency of the flying nor of the comfort of the aeroplanes. These were perfect

But one aspect of passenger transport aviation does deserve more forethought. Is it too much to ask for the swift service of meals at suitable stopping places so that the passenger need not arrive at his destination feeling that a square meal was long overdue? When meals cannot be served in flight, could not the steward carry a menu showing what can be obtained at the change-over aerodrome, and wireless ahead from the 'plane to the airport the requirements of the passengers? With such notice in advance, even a bare 15 or 20 minutes' stay would be enough to enable a hot meal to be served. On luxury air travel it should not be necessary to enter the new aeroplane with only a couple of apples and a banana wrapped up in a paper bag to keep one going until one is spilled out again on to another cold aerodrome on a wintry afternoon.



"Flight" photograph.

THE LATEST WICKO

Interesting Flying Characteristics of an Inexpensive Cabin Two-seater : The High-wing Monoplane Returns : Constructional Simplicity

IN spite of ever-pressing armament demands, the private owner has, as yet, no justifiable complaint concerning the range of types from which he may choose. While more of the bigger firms may or may not eventually show some interest in the manufacture of light and medium-light aeroplanes, there is not likely to be any shortage of such machines from the drawing boards and works of smaller firms who are satisfied with a comparatively small output. In some measure this is all to the good of the private owner, since the range from which he may choose is likely to be much greater, every designer having his own ideas on the subject of what the owner requires. Furthermore, when machines are built in batches of half a dozen, or even less, no particular hardships are involved in a drastic change of ideas.

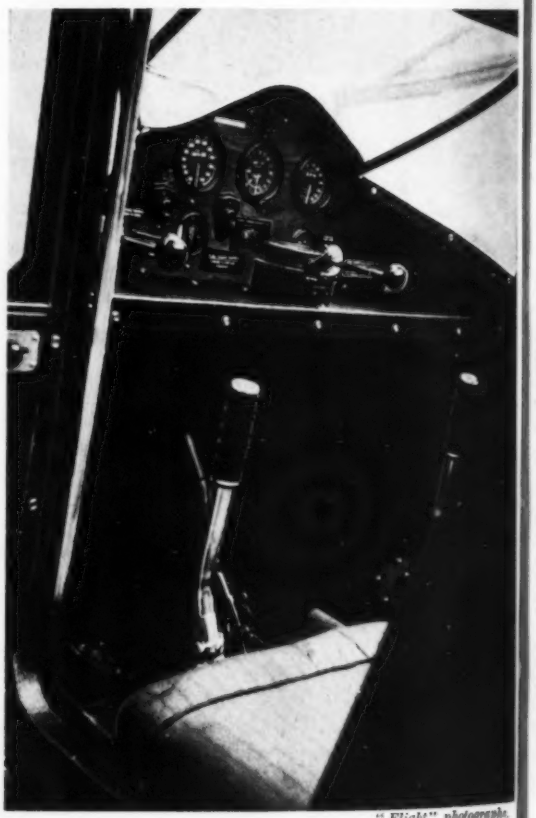
Old Into New

The Wicko (which now, with a Gipsy Major engine, possesses a full-sized performance and pay load) is something of a return to old-fashioned ideas applied in the modern manner. It is a braced high-wing monoplane and the occupants, therefore, have a really good view of the ground—a view which is to some extent denied them in the case of many high-efficiency types. It is, moreover, fitted with flaps of the not-often-considered contour-changing type. The structure tends to make the best use of old and new ideas, while this is, at the same time, designed to simplify and consequently to cheapen production.

In this country the high-wing machine appears to have died a natural and somewhat regretted death, and the Wicko provides a quite welcome revival in view of the machine's many good qualities, not the least of which are stability, vicelessness and the already-mentioned good view.

In *Flight* of July 8, 1937, the Minor-engined version of the machine was described from the flying point of view, and in many ways the latest model is similar in its characteristics. Nevertheless, quite apart from the extra power, certain important changes in the general layout have made considerable improvements both to the view and to the amount of available space in the cabin. The new machine is fitted with flaps which, when in use, transform an already safe and straightforward near-stall to one of almost unnatural stability. At the same time, these flaps do not in any way affect the good side-slipping capacities of the machine, so that the pilot has, apart from the variation in flap angle which may be made, the capacity to adjust an engineless approach within very wide limits.

(*Continued on next page.*)



"Flight" photographs.

In this view into the Wicko's cabin the flap lever may be seen behind the nearest of the two control columns. Engine controls are of the "organ-stop" type.

(Left) One of the "contour-changing" flaps of the Wicko, which assist considerably its already docile behaviour in the air.

A characteristic which appears as soon as the machine is taken into the air is its capacity for turning almost entirely on the rudder. There is, in fact, no need to hold off bank during a medium turn and the machine can be trimmed so that rudder-only turns can be made with fair accuracy. At the same time, less accurate, but nevertheless effective, turns can be made on the ailerons alone, though there is some lag.

During the side-slip, with the flaps either up or down, the machine will hold a constant air speed of 60 m.p.h. or less at any reasonable lateral angle on very little rudder, and, at least over a loss of a thousand feet there seems to be no tendency for the slip to build itself up and to demand more and more rudder until a change of bank is necessitated. The machine, with this little application of rudder, remains stably in the slip with the controls held stolidly in the same position.

The fact that it is quite practicable and safe to sideslip with the flaps in the fully down position gives, as I have already remarked, a great measure of adjustability to the approach. One can come in on a normal glide until it is obvious that the boundary will not be undershot and the bulk of the approach can be adjusted to very fine limits by a combination of sideslipping and use of the flaps, leaving, for preference, the latter's full-down position for the last few hundred feet. The flap lever has half-a-dozen different positions and these can be used with effect in, so to speak, the positive direction.

The Perfect Stall

With the engine on or off, and with the flaps up, the stall occurs at about 45 m.p.h. and this, when fully attained, causes a slight drop of the nose and of the starboard wing. Speed is, however, gathered again at once, control remains in reasonable measure throughout, and the loss of height is small. With the flaps down, and the air speed at very little more than 40 m.p.h., the Wicko remains quite steady and only the last inch or two of control movement precipitates the true stall, which results simply in a slight bucking motion and, again, in the falling away of the starboard wing. During the period before the true stall quite full control remains and there is not a sign of instability in any axis. In fact, it has the most pleasant near-stall of any machine which I have flown. Furthermore, with the use of a little rudder it is possible to weathercock the machine round to face any direction—a manœuvre which reminds one strongly of Autogirations.

Since the Wicko is controllable below the stall it is practicable to pull the machine off the ground just as soon as is possible, and the take-off technique for the best results somewhat resembles that used for a low-wing type. The landing process is a very simple one and it is difficult to see how anyone could fail to master what little there is to learn after a couple of circuits. The stick is brought back to neutral or thereabouts for the hold-off and the rest of the movement is final and quick.

When I first flew the Wicko, however, it was not by any means at its best when on the ground. After making allowance for the fact that the surface of Southampton Airport, where I flew the machine, was, at the time, somewhat generously provided with exceptionally hard irregularities, the undercarriage was certainly making heavy weather of it. A week or so later, however, I flew the machine again after adjustments had been made and taxied it fast over similar irregularities to be found in certain parts of Hanworth aerodrome. This time there were no complaints, and the fault is only mentioned for the benefit of any pilots who tried the undercarriage in its almost rigid original form.

The side-by-side seater cabin is roomy, well ventilated, and as quiet as that of any similar machine. In level flight the cowling lies just below the horizon, so that the forward view is good and the side windows may be slid open without producing the slightest draught. In fact, it would be possible to use the left-hand window very effectively in bad weather or, if the screen itself was opaque, in fine rain. The dual throttles are arranged on push-pull lines and protrude from the dashboard; either may be reached and used with the left hand. The brake lever is beneath the map tray on which the compass is mounted, and the flap lever lies between the two occupants with the trimming lever beside it. There is a door on each side of the cabin.

THE WICKO MAJOR MONOPLANE
130 h.p. Gipsy Major Engine

Span	31ft. 6in.
Length	23ft. 3in.
Weight, empty	1,255 lb.
All-up Weight	2,000 lb.
Maximum Speed	140 m.p.h.
Cruising Speed	122 m.p.h.
Landing Speed	45 m.p.h.
Range	500 miles
Price	£800
Makers	Foster, Wikner Aircraft Co., Ltd., Southampton Airport, South Hants.

Straight runs at low altitude gave the indicated maximum and cruising speeds at 140 m.p.h. and little over 120 m.p.h. respectively, the latter at an engine speed of 2,100 r.p.m. The machine may be obtained with either a 20- or a 30-gallon tank, the payload in the first case being, of course, better by seventy pounds or so. Nevertheless, with the larger tank, which gives an endurance of four and a half hours, the payload still allows the carriage of 150 lb. of baggage with two occupants at 170 lb. each. The figures given in the accompanying table are those for a machine fitted with the larger tank.

Although, generally speaking, the structure of the machine is quite straightforward, there are one or two points which are worth attention. In the interests of simplified and, consequently, cheaper production, for instance, a simple method has been developed of building up the box-type fuselage without the use of expensive jigs or of later adjustment. The four surfaces are jigged up separately, each with a split longeron, the latter being built up on assembly to form in each case a laminated whole. Inspection doors are provided in the skin of the wing, the structure of which may be described as of the semi-stressed-skin type. The ply covering takes all the drag loads and a certain proportion of the torsional and direct loads, which are subtracted, so to speak, from those taken by the struts. The machine has an aerobatic C. of A. and has already been dived to a speed of 210 m.p.h. without noticeable ill-effect.

H. A. T.

EQUIPMENT

Among the suppliers of equipment and material used in the construction of the new Wicko are: Accles and Pollock, Ltd.; Aircraft Materials, Ltd.; Airscrew Co., Ltd.; Louis Bamberger and Sons; Bendix, Ltd.; Lewis Berger and Sons, Ltd.; Improved Liquid Glues Co., Ltd.; Laminated Wood Products, Ltd.; London Name Plate Manufacturing Co., Ltd.; Palmer Tyre, Ltd.; Plastilume Products; Simmonds Aerocessories, Ltd.; Superflexit, Ltd.; Herbert Terry and Sons, Ltd.

SAFETY SWITCHES

CRASH fires are commonly due to two causes—(a) oil (*not* petrol) spilling on to hot metal, igniting and firing petrol vapour which has by then been released; (b) severed electrical connections. If the machine carries a battery the latter danger is particularly apparent, though ignition current alone can in certain circumstances cause a fire if the switches have not been "cut" before the crash.

Two interesting accessories recently submitted for Air Ministry approval have been designed to take care of these electrical contingencies. They are the Howdun master switch for battery circuits and automatic cut-out for ignition.

In the battery master switch, contact is made through a mercury bath. The internal design is so ingenious that while a shock sufficient to cause structural breakage or nosing-over of the aircraft will spill the mercury into an encircling channel, thus breaking the circuit, no landing shock will affect it. The switch can also be manually operated merely by turning its pivoted body downwards. It is reset by restoration to the normal position and the pressing of a button which allows the mercury to return.

In the automatic cut-out mercury again provides the means of contact. An arrangement of baffles confines it to a well, from which it cannot escape except under the impact of a crash, in which case a small quantity of the mercury is thrown through a narrow channel to bridge a gap in an earthing diaphragm, thus cutting out the ignition and stopping the engine. As with the master switch, a bad landing will not cause it to operate, nor is it affected by aerobatics.

To demonstrate this cut-out switch to *Flight* the inventor, Mr. P. W. Dunn, inserted it, upside down, in the ignition system of an elderly Morris car. He then drove the car fast over a number of obstacles, such as baulks of timber, but there was no breakage of the circuit under the obviously severe shocks. Mr. Dunn then released the bolts holding the switch to the engine, gave the switch a smart shake with his hand, and the ignition was instantly cut out. The effect was almost uncanny, suggesting that the inventor has somehow taught his switches the difference between harmless shocks and dangerous ones!

The switches, which can be fully screened for radio, are being developed by Howdun, Ltd., 121, St. George's Square Mews, London, S.W.1.

ASTRONOMICAL

The Air Estimates : Principal Votes in Appropriations to £73,500,000 : Air Mi[nis]pansion" Types of Aircraft Now in Ser[vi]ce

Vickers Wellesley

THE Air Estimates for 1938, issued on March 2, show a gross value of £111,502,000. Appropriations in Aid are expected to reduce this staggering figure to £73,500,000, a net increase of £17,000,000 compared with last year's Air Estimates.

In a Memorandum on the Air Estimates, the Secretary of State for Air, Viscount Swinton, explains that if the amounts appropriated in aid of the votes under the Defence Loans Act, 1937, are left out of account, together with the charge of £780,000 in respect of interest on the loan money taken in 1937, the resultant net total is £102,720,000, which is the true index of the net expenditure contemplated and the true measure of comparison with previous years.

Comparative figures for recent years are as follows:—

	1934 *	1935.*	1936.*	1937.	1938.
	£	£	£	£	£
Gross Estimate	20,365,000	31,002,100	55,748,700	88,588,600	111,502,000
Interest charge included	—	—	—	—	(780,000)
Deduct—					
Fleet Air Arm Grant	1,338,000	1,993,000	3,572,000	4,200,000	5,718,000
Other Appropriations-in-aid	1,266,600	1,413,100	1,476,600	1,888,600	2,284,000
Loan provision	—	—	—	26,000,000	30,000,000
Net Estimate to be voted	17,761,000	27,596,000	50,700,100	56,500,000	**73,500,000**
Corresponding figures **excluding the Loan elements**	17,761,000	27,596,000	50,700,100	82,500,000	**102,720,000**

* Including Supplementary Estimates.

The Memorandum explains that the increase of £1,518,000 in the grant from the Admiralty in respect of the Fleet Air Arm arises in part from an increase in strength and in part from a payment in respect of training services for naval personnel of the Fleet Air Arm hitherto borne on Air Votes without recovery.

On the subject of progress of expansion, the Memorandum points out that the formation and training of new units for the Metropolitan Air Force have occupied a position of paramount importance. Since April, 1935, the strength of that Force has been increased from 52 to 123 squadrons, of which one is at present overseas, and now comprises 68 Bomber squadrons, 30 Fighter squadrons, 15 squadrons of General Reconnaissance aircraft and Torpedo Bombers, and 10 squadrons of Army Co-operation aircraft, with greatly enlarged training and reserve organisations in support.

Reorganised Command

The increase in the number of home defence squadrons has made it necessary to effect an extensive reorganisation of the R.A.F. system of command and administration. The responsibilities of the former Air Officer Commanding-in-Chief, Air Defence of Great Britain, have been divided between an A.O.C. in C. in command of the Air Striking Force, and an A.O.C. in C. in command of the Fighter and Army Co-operation units, who is also in operational control of the country's ground defences, comprising anti-aircraft gun and searchlight units and the units of the balloon barrage. Subordinate to the main commands there have been introduced a number of groups, organised partly on functional and partly on geographical lines. So far as possible, the task which each unit will perform in war has been the governing factor in determining its place in the peace-time organisation. A separate Maintenance Command will be formed in the course of 1938 to administer the maintenance units.

The post of Inspector-General of the R.A.F. has been revived to follow development of the R.A.F. and report regularly to the Air Council upon the efficiency and training of the Force.

To ensure smooth progress of the expansion scheme it was necessary to secure close co-ordination and balancing of all parts of the programme, and a plan was drawn up on broad lines covering every aspect of requirements. To ensure continuous watching and effect adjustment of details, weekly meetings of the Air Council were instituted, with Lord Weir as adviser on industrial matters.

When the expansion scheme was launched, it was decided that the basis of the large-scale supply of aircraft required must be the firms of the aircraft industry which had been working in collaboration with the Air Ministry for the supply of airframes and engines during the pre-expansion period, and which had thus acquired a vast fund of design experience. These firms were accordingly encouraged to extend their works to the extent necessary to meet Air Ministry orders, and provision was made whereby the Air Ministry would, subject to certain conditions, indemnify the firms against the possibility of ultimate loss in respect of the cost of any extensions which subsequent experience showed to have been required to meet expansion orders only.

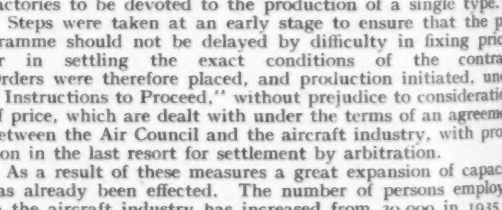
The programme authorised in March, 1936, the main features of which were the re-equipment of the Force with more powerful types of aircraft, and the provision of war reserves of aircraft and equipment on a comprehensive scale in addition to an increase in first-line strength, required the provision of aircraft, engines and equipment on a scale substantially in excess of the maximum capacity of the industry. To meet these demands, the decision was taken to make use in peace of motor car manufacturing firms which were allocated to the Air Ministry for production in war. The establishment of the two aircraft shadow factories and six engine shadow factories which followed the adoption of this policy will serve two main objects: it will provide for the production of that part of the war reserves of aircraft and engines which is beyond the capacity of the aircraft industry, and it will afford training in the manufacture of aircraft and engines of the utmost value to firms which would be allocated to this work in emergency. This shadow factory scheme gives promise of proving highly successful, and, with its advance to full production, a vast improvement will have been wrought in our production capacity, with consequential and far-reaching effects on war potential.

"Off the Drawing Board"

In view of the great urgency of the programme and the vital necessity for obtaining aircraft of the most modern type and performance, it was also necessary to place large production orders before the construction and testing of the usual prototype. This procedure involved certain initial difficulties, but it has very substantially shortened the time of getting new types into production and has accelerated their supply to units. As a further step to ensure maximum production, the number of types in the Service is being progressively reduced, thus simplifying the production problem and allowing several factories to be devoted to the production of a single type.

Steps were taken at an early stage to ensure that the programme should not be delayed by difficulty in fixing prices, or in settling the exact conditions of the contract. Orders were therefore placed, and production initiated, under "Instructions to Proceed," without prejudice to considerations of price, which are dealt with under the terms of an agreement between the Air Council and the aircraft industry, with provision in the last resort for settlement by arbitration.

As a result of these measures a great expansion of capacity has already been effected. The number of persons employed in the aircraft industry has increased from 30,000 in 1935 to roughly 90,000, and, in addition, large numbers are employed in the production of armament and every kind of equipment.



Bristol Blenheim

AIR FIGURES

Votes in Gross Value of £111,502,000, Reduced by Air Mi orandum Describes Progress : Six "Ex- in Sq ice : Generous Civil Aviation Votes

Armstrong-Whitworth Whitley

and on sub-contracting work for the aircraft firms. Still greater numbers will be necessary during the coming year as the shadow production gathers momentum and the professional industry approaches its maximum output.

The provision of aircraft for new Royal Air Force squadrons fell necessarily into two fairly distinct phases. There was first the necessity of providing for newly formed squadrons a sufficient supply of service aircraft to enable them to train and to acquire experience as operational entities. For this purpose large orders were placed for types of aircraft already available in production, and deliveries were made at a rate which enables service training to proceed without interruption or delay. Simultaneously, as already explained, arrangements were made for the large-scale production of more powerful types, re-equipment with which was a cardinal feature of the programme.

Re-equipment

It is the second phase, that of re-arming with new and more powerful types, which is now in operation. Much progress has already been made, and substantial numbers of aircraft of the following expansion types are already in the squadrons:—Harrow, Blenheim, Wellesley, Whitley, Battle and Hurricane. The process of re-arming has been slower than was hoped when the programme was planned, as delivery of new-type aircraft has been affected by three important factors. In the first place, the scale of the orders placed was such that much time was necessarily absorbed in constructing new shops and in arranging for the supply of the jigs and tools necessary for large-scale production. Secondly, the decision to expand coincided with far-reaching developments in design, and the new types ordered were larger and more difficult to construct than pre-expansion types. Thirdly, there has been a shortage of draughtsmen and skilled labour. Re-arming will, however, be substantially completed during the coming financial year, and full operational effect will be rapidly achieved with the more powerful types of aircraft as a result of the great progress made with other parts of the scheme, particularly in the matter of squadron training.

Coupled with these orders on an unprecedented scale for aircraft and engines, there have been correspondingly large demands over the whole range of armament and equipment, and many new types of equipment have been introduced. Requirements for such equipment were worked out and planned for the whole programme, and productive capacity was arranged on this basis. Where equipment of foreign design has been chosen, for example, one type of machine gun and certain flying instruments, initial orders were placed abroad to avoid delay, and adequate arrangements have been developed for manufacture at home. In most cases, however, requirements have been met by the use of British inventions and developments, and these have been put into production.

The problem of securing the greatest possible operational efficiency for defence purposes of the *matériel* of the Royal Air Force has involved an intensive programme of research and development. Particular reference should be made, on the research sides, to the revolution in aerodynamic efficiency which has occurred in the last few years, based on studies of the flow of air over the surfaces of aircraft bodies and wings, and of the origin of drag forces.

Important improvements have also taken place in the design of aero engines, and the result of many years' painstaking research and development work has been the introduction into the Service of a series of engines of outstanding performance. Work is continuous, and there is every reason to believe that the engines under consideration for introduction into the Service will keep this country well in the forefront in this sphere of development. The staff of the Air Ministry scientific and technical establishments has been increased by more than half since 1936.

Handley Page Harrow

The expansion programme has necessarily involved a great expansion of training facilities. In the vital matter of training of pilots, not only have these extended facilities enabled the full requirements of pilots for the programme to be met, but they have also been organised in such a way as to result in a general raising of the standard of training. This result has been achieved by the introduction of a new system of training, under which pupils are instructed in elementary flying at civil schools before being posted to the Service flying training schools. In consequence, it has been possible widely to extend the scope of instruction at the Service schools, and it is the general opinion of the responsible officers that the young pilots leaving the schools, who now receive an average of 150 hours' flying experience before joining their squadrons, are better trained than ever before. One further advantage of the new system should be mentioned. The higher standard of training of the pilots now leaving the schools relieves the squadrons of the responsibility for much of the individual training which fell to them under the older system, and enables them to concentrate on operational training at an earlier stage.

Over the period of the expansion, moreover, there have been drastic changes of both operational practice and training methods as a result of developments in the use of wireless and flying instruments. Before expansion started, a course of instrument flying had been introduced at the Central Flying School, and as qualified instrument flying instructors have become available, instrument flying has been introduced in the syllabus at flying training schools. All dual control service aircraft at such establishments have now been fitted with hoods for blind flying practice, and in order to maintain the efficiency of qualified pilots in this form of flying, dual control aircraft fitted with hoods are available in all Service squadrons.

The Missing Link

The Royal Air Force was the first Air Service to make large scale use of the Link trainer, a device which enables all the operations of instrument flying to be taught and practised on the ground under remarkably realistic conditions. Experience has shown that this device can be used to advantage not only in the initial stages of training, but also for giving practice to experienced pilots, and for instructing them in the Lorenz blind landing system. All Service flying training schools and the majority of bomber stations at home are now equipped with this apparatus, and as supplies become available arrangements will be made for every station at home and overseas to be equipped with at least one such trainer.

A new standardised panel of all the instruments required by the pilot for blind flying has also been introduced into the Service and is being incorporated in all the latest types of aircraft.

A large increase has been effected in directional wireless and meteorological facilities. Apart from civil stations, 35 meteorological and 19 direction-finding stations will be available by the end of March, 1938, compared with 21 meteorological and 6 direction-finding stations in 1935, and 31 additional meteorological stations and 11 additional direction-finding stations are now in course of construction.

The provision of adequate facilities for armament training has been an additional requirement of great importance. The number of Armament Training Camps has already been increased from three in 1934 to seven, and four others are in course of preparation. Intensive use is made of these facilities throughout the year, and the pilots and crews of all squadrons are required to go through a course annually. Armament training has also been introduced into the syllabus of flying training schools, and a new and extended air armament school with a large range area, for training armament instructors, will be opened at Manby, Lincolnshire, in August.

It is a matter of great regret to record that there has been

a substantial increase in the number of fatal accidents. Deeply as this loss of life is to be deplored, a careful analysis of the records shows that the increased casualties are due to the greater size of the Air Force, and not to any other, and avoidable, cause.

On the personnel side, the expansion programme necessitated the entry, between April, 1935, and March, 1938, of approximately 4,500 pilots and 40,000 airmen and boys, or an annual average of more than 1,500 pilots and 13,000 airmen. These entries may be compared with typical annual pre-expansion entries of about 300 pilots and 1,600 airmen.

Hawker Hurricane

The majority of new pilots have been entered under the short-service scheme, which is designed to provide the large number of officers required in the junior ranks, and also a reserve of pilots in emergency. But the permanent cadre has also been extended, by enlarging the entry to the Cadet College at Cranwell to its full capacity, and by increasing the number of officers taken in from the Universities to permanent commissions. It has also been possible to increase largely the number of airmen selected from the ranks for training as pilots, and to give a larger number of commissions to airmen of outstanding merit. It is a great tribute to the youth of the country that an adequate flow of candidates of good character and physique has been available for flying posts, and that the large entries necessary to date have been attained with no serious falling off in the standard.

The Dominions have made an invaluable contribution to Air Force requirements in pilots, and some 430 Dominion candidates have joined the Royal Air Force as pilots during the last two years. Selection and medical boards have now been established in Canada, Australia, New Zealand and Southern Rhodesia, and a central board has been established at Nairobi for considering applications throughout British territory in East and Central Africa. It is hoped that in future years still larger numbers of candidates from the Dominions and Colonies will join the Force.

A further development which may be mentioned is the introduction, in co-operation with the War Office, of a scheme of air training for the Junior Division of the Officers Training Corps.

Apprentices

A vital feature of the programme has been the recruitment of a sufficient number of aircraft apprentices, chosen from boys of good education from the secondary and technical schools, for training as fitters, wireless operator mechanics, etc. Here, again, it has been possible substantially to meet the greatly increased requirements, and a total of approximately 6,300 apprentices has been entered for training since April, 1935. To meet requirements in the slightly less skilled trades of wireless operator, armourer and photographer, boys are taken into these trades for a course of training of from a year to 16 months. Some 2,100 boys have been entered in this way since 1935, and the balance of requirements in these trades has been met by the entry of 4,250 men.

To be fully effective, any increase in the first-line strength must be accompanied by a corresponding increase in reserves. With a view to solving the problem of personnel reserves, a problem rendered more difficult by the present necessity for retaining short-service personnel beyond the normal active-list period, a new force—the Royal Air Force Volunteer Reserve—was created. Since April, 1937, over 1,000 pilots have been entered into this reserve, against the original forecast of 800 for the year, while medical and equipment branches have also been created. During 1938, a section will be formed to provide crews for aircraft, i.e., observers, wireless operators and air gunners. Training is carried out both at aerodrome centres and at town headquarters, and 21 aerodrome centres are now in operation, while 12 further centres will be opened during the coming year.

Prior to the first expansion programme there were 52 Air Force stations located on aerodromes in the United Kingdom. Apart from major extensions at a large number of these stations, expansion requirements have necessitated the acquisition of 59 new aerodromes and, of these, 30 are already in occupation by Air Force units.

The selection of new sites for Air Force stations is necessarily governed primarily by operational considerations, but it is not generally realised that many other important requirements must also be satisfied.

The means by which the essential needs of defence can be met without avoidable interference with other interests of national importance have been very carefully considered.

Before construction work was started at new stations, a planned building programme to meet the full requirements of the expansion scheme was drawn up. A considerable degree of standardisation was introduced, both in the lay-out of stations and in the design of buildings, and this, by reducing drawing office work and by simplifying requirements, has enabled rapid progress to be made in construction, and has resulted in considerable economy.

Civil Aviation

Lord Swinton deals, in his Memorandum on the Air Estimates, fairly extensively with the subject of civil aviation. He recalls that the first stage of the Empire Air Mail Scheme was inaugurated on June 29, 1937, connecting the United Kingdom with South Africa. Up to the end of January more than 190 tons of mail were carried from this country to destinations in Africa. The second stage, involving services between this country, India and Singapore, commenced on February 23 last. The full scheme, including through-services to Australia, will be in operation later in the year.

It is hoped to continue the air service from Khartoum to Accra during 1938, and to extend it farther west.

After negotiations with the Siamese Government for regular services via Bangkok, the air service to Hong Kong has its western terminus at Bangkok, and it is hoped to carry mails without surcharge to Hong Kong before the end of the year.

Lord Swinton also refers in his Memorandum to the regular flying-boat service between Bermuda and New York, and to the night mail service operated by British Airways to Hanover and Berlin in conjunction with German, Danish and Swedish companies, and mentions the survey party which made a preliminary visit of investigation to West Africa in connection with the proposed air routes to West Africa and South America undertaken by British Airways.

The transatlantic flights last summer, and the survey flight of the Tasman Sea by *Centaurus* are also dealt with, but will be fresh in the memory of *Flight* readers.

The expenditure of approximately £300,000 on essential ground equipment will complete the main features of the organisation of the Empire routes.

Of the failure of the Langstone Harbour Empire terminus scheme the Secretary of State for Air states that it has been decided not to proceed with the barrage scheme, but to give consideration to the requirements essential for a marine base only.

Fairey Battle

Lord Swinton also recalls that the Air Ministry has placed an order for two De Havilland Albatross machines to assist development for transatlantic services, and that it has stood, by its subsidy policy, behind the Empire flying boats. "In a similar way," the Memorandum continues, "they are fostering the production of the new long-range flying boats which are being built for the regular North Atlantic service."

This part of the Memorandum contains the following interesting statements:—

"The development programme for 1938 includes proposals for facilitating the development of civil transport aircraft types of medium size, following discussions between the Air Ministry and operating companies. Proposals are also being worked out for the production of prototype aircraft for long-range flying, including flying at high altitudes, with the object of

developing express services, and for obtaining a design for a long-range civil transport aircraft on an altogether larger scale, with which it would be possible to equip services of the quality which will probably be required within the next few years. The total provision for expenditure within the year on these items, including the continuation of previous programmes and an aircraft specifically required for radio research and development, amounts to £200,000."

"Implimentary"

Concerning the recommendations made in the Maybury Report, Lord Swinton states that action has been taken to prepare the Order in Council required to set up the licensing authority for internal routes, and that provision has been made in the Estimates for the expenditure of approximately £250,000 on the radio control, radio and meteorological facilities recommended by the Report. The final plan visualises Air Ministry control staffs at 15 area stations and 20 aerodromes stations. Action is also in hand to provide the necessary beacons for radio-assisted landings.

Heston aerodrome was acquired last November, and negotiations are in progress for the acquisition of the remaining land. The sum of £285,000 has been provided in the Estimates, together with £60,000 for the necessary works services.

Croydon is to benefit to the tune of £85,000 for additions and alterations.

After explaining the extent to which the Air Registration Board has taken over from the Air Ministry the work of inspecting civil aircraft for C. of A., Lord Swinton states that a sum of £10,000 is provided in the Estimates towards the expenses of the Board.

The Estimates also provide for grants amounting to £40,000 to light aeroplane clubs and £5,000 for development of gliding.

The concluding part of the Memorandum deals with meteorology, as follows:—

"The cross-country flights made by the Royal Air Force are increasing in length and frequency, while they must be carried out in all types of weather and during the night as well as by day.

"The weather over the British Isles is notorious for the rapidity of its changes and for its diversity in different parts of the country. It is therefore necessary that meteorological information and advice should be available on all aerodromes, both Royal Air Force and Civil. The development of the Meteorological Service to meet these needs is proceeding along the following lines. There will be a number of meteorological centres where complete information of the existing weather situation is available and forecasts are prepared of probable changes. Several of these centres will be open day and night. All other aerodromes will be in communication with one or other of the centres, and on the majority of them there will be meteorological staff to make the connection, receive the information and interpret it to the flying personnel.

"The ultimate aim is to have observations of the weather made in all parts of the country every hour, day and night, and to render these observations immediately available at every aerodrome in the country. At present this is being partly met by the Borough Hill broadcast station, which issues hourly, between 7 a.m. and midnight, observations from about 80 stations, representative of most parts of the country. This issue of meteorological information by wireless telephony is to be supplemented by a teleprinter service wholly devoted to meteorological purposes. All aerodromes will be connected together by teleprinter so that meteorological messages can be transmitted to them simultaneously.

"One problem in this is to provide rapidly the large number of personnel trained in meterology required to man the new stations and to extend the hours at many of the old stations. There is no body of professional meteorologists on which to draw and the personnel must be recruited direct from the Universities and the Secondary Schools and trained after recruitment.

Meteorologists Wanted

"To meet the total needs of the expanded Royal Air Force in Great Britain, it is estimated that at least 241 meteorological personnel will be required on Royal Air Force aerodromes in this country, and this number will be increased if it is found necessary to extend meteorological watch at all meteorological stations throughout the 24 hours.

"During the financial year 1937, 16 new meteorological stations have been opened on Royal Air Force aerodromes. A new meteorological station has been opened at Bristol for civil aviation and at Hythe (Southampton Water) for the Empire air route. The station at Foynes, established by the Government of Eire in connection with the trans-atlantic air route, has been manned by Meteorological Office personnel. The total number of meteorological stations on aerodromes in Great Britain on 31st March, 1938, will be Royal Air Force 35, Civil 5. It is expected that another 31 Royal Air Force aerodromes will be provided with meteorological stations in the coming year, apart from the new stations required by civil aviation.

"In addition to meteorological stations maintained by the Air Ministry at home and overseas, the Empire Air Mail Scheme has involved the development of meteorological services in several Empire countries which are unable to meet the whole cost. £28,000 is provided in these Estimates for grants in aid, mainly to these Empire Governments, towards the provision of equipment and buildings."

ABSTRACT OF AIR ESTIMATES, 1938

Votes.		ESTIMATES, 1938.			ESTIMATES, 1937.			DIFFERENCES ON NET ESTIMATES.		Votes.
		Gross Estimate.	Appropriations-in-aid.	Net Estimate.	Gross Estimate.	Appropriations-in-aid.	Net Estimate.	Increase.	Decrease.	
A	I.—NUMBERS: Maximum Number of Officers, Cadets and Airmen to be borne on the Establishment of the Royal Air Force, exclusive of India	—	—	Total Numbers. 83,000	—	—	Total Numbers. 70,000	Numbers. 13,000	Numbers. —	A
	II.—EFFECTIVE SERVICES:	£	£	£	£	£	£	£	£	
1	Pay, etc., of the Royal Air Force ...	10,995,000	820,000	10,175,000	9,001,000	535,000	8,466,000	1,709,000	—	1
2	Quartering, Non-Technical Stores, Supplies and Transportation ...	6,308,000	164,000	6,144,000	4,600,000	124,000	4,476,000	1 668,000	—	2
3	Technical and Warlike Stores (including Experimental and Research Services)	66,734,000	24,103,000	42,631,000	48,132,000	16,590,000	31,542,000	11,089,000	—	3
4	Works, Buildings and Lands... ...	16,322,000	12,522,000	3,800,000	18,525,000	14,525,000	4,000,000	—	200,000	4
5	Medical Services	558,500	34,500	524,000	466,000	27,000	439,000	85,000	—	5
6	Technical Training and Educational Services	1,055,000	15,000	1,040,000	755,500	14,500	741,000	299,000	—	6
7	Reserve and Auxiliary Forces ...	1,662,000	2,000	1,660,000	1,360,100	100	1,360,000	300,000	—	7
8	Civil Aviation	3,161,000	236,000	2,925,000	2,499,000	184,000	2,315,000	610,000	—	8
9	Meteorological and Miscellaneous Effective Services	(a) 2,630,500	43,500	2,587,000	1,463,000	34,000	1,429,000	1,158,000	—	9
10	Air Ministry	1,510,000	20,000	1,490,000	1,264,500	14,500	1,250,000	240,000	—	10
	Total Effective Services ...£	110,936,000	37,960,000	72,976,000	88,066,100	32,048,100	56,018,000	17,158,000	200,000	
11	III.—NON-EFFECTIVE SERVICES: Half-Pay, Pensions and other Non-Effective Services	(a) 566,000	42,000	524,000	522,500	40,500	482,000	42,000	—	11
	Total Effective and Non-Effective Services... ... ... £	**111,502,000**	**38,002,000***	**73,500,000***	88,588,600	32,088,600	56,500,000	17,200,000	200,000	
								Net Increase £17,000,000		

(a) Certain non-effective charges in respect of staff for Meteorological Services are provided for under Vote 9.

* The Appropriations-in-aid (*see* Vote 3, subhead J, page 59, and Vote 4, subhead N, page 103) include sums aggregating £30,000 000 to be provided by issues from the Consolidated Fund under the Defence Loans Act, 1937 (1 Edw. 8 and 1 Geo. 6, c. 13). The net total of Air Estimates, 1938, before deducting sums to be received from this source is £103,500,000. The comparable figures in Air Estimates, 1937 were £26,000,000 and £82,500 000, respectively.

SERVICE AVIATION

Royal Air Force and Official Announcements : Fleet Air Arm News : Military Aviation Abroad

Honorary Physician to the King

THE King has approved of the appointment of Air Commodore Harold Edward Whittingham, C.B.E., M.B., Ch.B., F.R.C.P.(E.), F.R.F.P.S.(G.), M.R.C.P.(Lon.), D.P.H., D.T.M. and H., as an honorary physician to His Majesty with effect from March 1, vice Air Vice-Marshal Sir Alfred W. Iredell, K.B.E., C.B., M.R.C.S., L.R.C.P., who vacated the appointment on his retirement from the Royal Air Force on that date.

Air Comdre. H. E. Whittingham, born in 1887, was commissioned in the Royal Army Medical Corps in January, 1916, as a temporary Lieutenant. In October, 1918, he was transferred to the Royal Air Force (Medical Branch) as an acting Major, and in August the following year was granted a permanent commission with the rank of Squadron Leader. During the period 1921 to 1923 Air Comdre. Whittingham carried out several researches in Malta in connection with the origin and prevention of sandfly fever, and in 1924 received the Air Council's high appreciation of his valuable services rendered in that connection. From January, 1925, to July, 1935, he commanded the R.A.F. Pathological Laboratory, Halton. In recent years he has been in command at the R.A.F. Central Medical Establishment, and has acted as Consultant in Hygiene, Pathology and Tropical Medicine. Air Comdre. Whittingham was awarded the C.B.E. (Military Division) in the Birthday Honours List, 1930. He was promoted to Wing Commander in 1923, to Group Captain in 1932, and to his present rank in 1936.

Acquisition of Sites for Royal Air Force

THE Secretary of State for Air has appointed Professor L. P. Abercrombie, M.A., F.R.I.B.A., to act as Consultant in connection with the acquisition of sites required on account of the expansion of the Royal Air Force. Professor Abercrombie is Professor of Town Planning, Bartlett School of Architecture, University College, London, and is Consultant Architect to the Department of Health for Scotland.

The selection of sites for Royal Air Force purposes is in varying degrees governed by strategic and other Service considerations. Within the limitations thus imposed, it has consistently been the policy at the Air Ministry to take into account the many and varied considerations affecting the life of the community, both local and national. The appointment of Professor Abercrombie is designed to ensure that the best possible advice is readily available at all stages in connection with the acquisition of a site.

Aden Protectorate

MECHANISATION is dealing heavy blows to stock-breeders in many parts of the world, and its effects have also been felt in the somewhat primitive area of the Aden Protectorate. The camel owners and breeders there have seen their livelihood threatened by motor transport, and their indignation resulted in a series of raids last year on motor caravans. Possibly the British authorities are connected in the minds of the tribesmen with this march of progress; or perhaps a general spirit of lawlessness is bound to end in anti-British outbreaks. At any rate the movement culminated in an attack on a political officer of the Subeihi tribe.

Most of the tribes are nominally under the suzerainty of more important local chiefs, usually holding the title of Sultan or Amir, and it is our policy to charge these Sultans with the maintenance of order in their territories. The Sultan of Lahej was accordingly asked to punish the culprits. He maintains a body of trained troops, and he despatched a column of them into Subeihi territory. By an excellent piece of co-ordination the whole of No. 8 (Bomber) Squadron arrived over the same spot at the same time. As a result all but one small village of the Subeihi submitted and this village was subjected to air action. This means that a warning was given and then the aircraft kept the villagers out of their village until they submitted, sometimes bombing the empty houses of the ringleaders. The result in this case, as in most cases of the same sort, was most satisfactory.

FIGHTING STOCK : Tigger, mascot of No. 111 (Fighter) Squadron, Northolt, has evidently ceased to be impressed by the formidable "300-plus" Hawker Hurricanes.

Not long after another tribe, the Quteibi, damaged a landing ground and threatened to fire on an aircraft which had forced-landed there. Loyal tribesmen drove the worst culprits out of their district, but one section remained recalcitrant, until a raid was made by the whole of No. 8 (Bomber) Squadron. By a piece of luck a salvo of bombs fell just outside a cave in which some of the chief offenders were hiding. They thought that their refuge had been discovered, and made complete submission, accepting the Government's terms and agreeing to keep the peace in future.

The Esher Trophy

THE Esher Trophy, awarded annually after an efficiency competition between squadrons of the Auxiliary Air Force, has been won for the third time by No. 604 (County of Middlesex) (Fighter) Squadron. The competition this year was between the fighter units of the A.A.F., of which there are now five, and the runner-up was No. 607 (County of Durham) (F.) Squadron. Best congratulations to Sqn. Ldr. C. P. Gabriel, the C.O. of No. 604, and his officers and men.

Award for "Exceptional Courage"

THE King has been graciously pleased to approve of the award of the Air Force Medal to Corporal T. E. Barnes "in recognition of exceptional courage and devotion to duty displayed on the occasion of the forced landing of an aircraft near Hinckley on December 3, 1937."

Staff College, Quetta

SQN. LDR. E. L. S. WARD has completed satisfactorily a course at the Staff College, Quetta, which terminated in December, 1937, and is entitled to the symbol "*q.s.*" against his name in the Air Force List.

Aircraft Carriers

IN addition to the five aircraft carriers now under construction the Admiralty has decided to order a sixth carrier next year. The five now building are *Ark Royal*, which was launched on April 13, 1937, and is expected to be completed during the coming summer; *Illustrious* and *Victorious*, being constructed by Vickers-Armstrongs at Barrow-in-Furness and High Walker respectively, which were laid down in the spring of 1937; *Formidable*, laid down in March, 1937, by Harland and Wolff at Belfast, and *Indomitable*, laid down at Barrow in July, 1937, by Vickers-Armstrongs.

The Navy Estimates just presented to Parliament provide for a totally new type of vessel, a repair and supply ship for the Fleet Air Arm, the design of which has not yet been decided. Such a vessel should certainly be of great service to the Fleet and add to the efficiency of the carriers.

SERVICE AVIATION (CONTINUED)

Navy Short-Service Officers

FURTHER details have been published about the training of the short-service officers who are to be accepted as pilots for the Fleet Air Arm. The first stage will be three months at Devonport, where they will be introduced to naval discipline and traditions, and will learn certain naval routine, such as handling boats. They will then pass to R.A.F. civil and Service flying schools, but naval personnel will be attached to these schools to exercise discipline over the naval pupils and to continue their naval education. This stage will last for ten months. The third stage will be instruction in the specialised duties of naval air work, such as deck landing and catapult training, navigation and wireless. This will last for six months and will be divided between the training bases of Gosport, Lee-on-the-Solent and Ford. This stage will culminate in a short cruise in the training carrier *Furious*. The officers will then be appointed to either a carrier or a catapult ship, and will carry out full flying duties.

Rating Pilots for Fleet Air Arm

REGULATIONS have now been issued by the Admiralty for the selection of naval ratings for training as pilots in the Fleet Air Arm. Candidates will be selected mainly from the ratings of the seaman, signal, and telegraphist branches, between the ages of 21 and 24 years. Initial training will be for about one year on shore and then for eight weeks in a training carrier. On completing their training candidates will be advanced to petty officer (confirmed). The normal period of service on full flying duties will be seven years from the beginning of training. Thereafter the ratings will pass into one of three categories: (a) A limited number will be allowed to extend their flying service for three more years, to complete time for pension; (b) those who remain fit for flying duties but are not selected for the first category will form a flying reserve inside the service, and will do a certain number of flying hours annually; and (c) those who cease flying finally. So far as possible men in the two latter classes will be employed in connection with the Fleet Air Arm.

It is expected that twenty men will be needed for a course starting about May 1 next. Medical examinations will be held by R.A.F. medical boards.

A Change in Title

THE name of No. 2 Air Armament School, North Coates, is changed to No. 1 Air Observers School with effect from March 1.

Vacancies for Apprentice Clerks

FOR boys of school certificate, or approximately equivalent educational standard, a substantial number of vacancies in the Royal Air Force for apprentice clerk will occur in April next.

Candidates are required to be not less than 15¾ years of age and not more than 17¼ years of age on April 1 next. The conditions of entry are contained in A.M. Pamphlet 9, a copy of which may be had, free, upon application to the Inspector of Recruiting, Royal Air Force, Victory House, Kingsway, London, W.C.2.

Apprentice clerks receive a training for approximately 18 months and are attested for twelve years' regular Air Force service dating from their eighteenth birthday. At eighteen years of age the commencing rate of pay as airmen varies from 21s. to 31s. 6d. per week according to the degree of success on passing out of training.

A limited number of airman clerks will be permitted to re-engage to complete twenty-four years' service in all, thus qualifying for a pension. On return to civil life ex-apprentice clerks who complete only the original period of twelve years may be allowed to enter the Reserve and to draw a gratuity of £100.

Apprentice clerks may volunteer for training as airmen pilots.

Cambridge U.A.S. Dinner

THE Chief of the Air Staff, Air Chief Marshal Sir Cyril Newall, was the chief guest at the annual dinner of the Cambridge University Air Squadron last Friday, and, in replying to the toast of "The Guests," he remarked that the squadron's annual dinner had become famous, and he had been looking forward to enjoying it for the first time. He was a Sandhurst man himself, and his ideas on a university were that it meant three things—youth, comfort, and learning with progress. As regards comfort, he saw so many of his colleagues round the table that he felt sure there would be no work done in the Air Ministry next day. An evening like that was as good as a week's leave to an officer of the R.A.F. About learning he spoke with some hesitation, but he gave the highest praise to the research work being done at Cambridge. He briefly summarised the progress of R.A.F. expansion, and ended by saying that the C.U.A.S. was a really fine show.

The Vice-Chancellor, Professor H. R. Dean, proposing the health of the Squadron, made a very witty speech. He said that the members of the Squadron could look down on all England (sic) from John o' Groats to Land's End, except on their own university town. It was forbidden to Cambridge men to look down on Cambridge, and especially to look down on a professor lecturing. He paid a tribute to Professor Melvill Jones, and remarked on his astonishment when he heard that the professor had recently been passed for solo and was then an "ordinary" member of the Squadron. He also mentioned that Flight Lieut. R. T. Gething, of the Long-distance Flight, was an ex-member of the C.U.A.S.

Mr. D. G. Parnall, of Downing College, returned thanks in a very happy speech.

The Chief Instructor, Wing Comdr. C. E. W. Lockyer, supported by his adjutant and flying instructors, was a most admirable host, and the whole evening was as enjoyable as any of the numerous guests could possibly have desired.

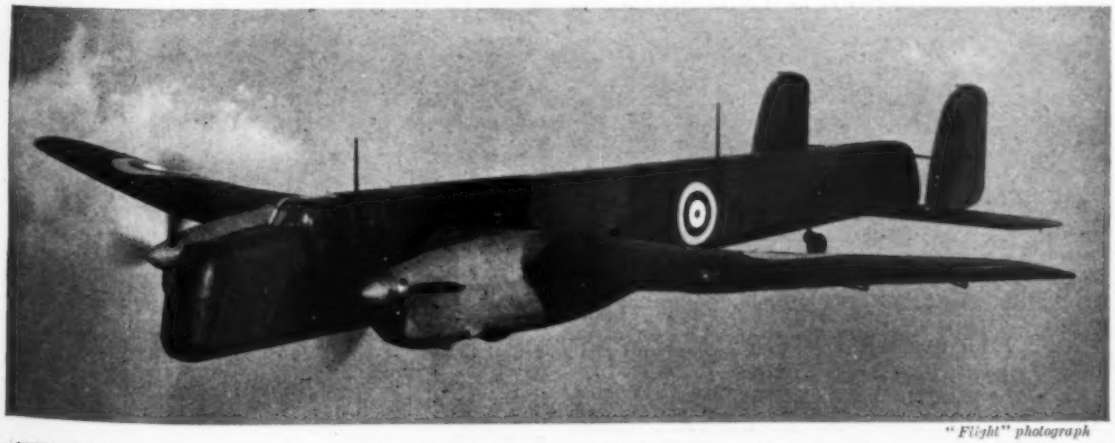
Flying Accident

FOLLOWING the disappearance on February 24 of an aircraft of the Long Range Development Unit, Upper Heyford, the Air Ministry announces with regret that, as extensive air and ground searches have failed to find the aircraft and its occupants, it must now be accepted that Flt. Lt. Frank Steight Gardner, F/O. George James Douglas Thomson and Sergt. George Higgs lost their lives on that date. Flt. Lt. Gardner was the pilot.

Reunion Dinners

THE fourteenth annual reunion dinner of the R.A.F. Staff College Dinner Club will be held at Grosvenor House (Grill Room Entrance in Park Lane, W.1) on Friday, March 25, at 7.30 p.m. for 8 p.m. Air Chief Marshal Sir Edgar Ludlow-Hewitt, K.C.B., C.M.G., D.S.O., M.C., will be in the chair. Evening dress (tail coat, no miniatures) will be worn. The inclusive charge will be 16s. Officers intending to be present should forward a cheque as soon as possible, to the Hon. Sec., R.A.F. Staff College Dinner Club, Andover, Hants. Cheques should be made payable to the honorary secretary and crossed "Dinner Club A/c."

No. 10 Squadron, R.F.C. and R.A.F., will hold its eleventh annual reunion dinner on March 26. All ranks are welcome. The charge will be 5s. 6d. Applications should be made to Mr. A. F. Williams, "Rozel," Amersham, Bucks.



"Flight" photograph

MERLIN-POWERED: An Armstrong Whitworth Whitley heavy bomber fitted experimentally with two Rolls-Royce Merlin engines. The installations are graced with all the latest advances, including ejector-type exhaust pipes. It may be that the engines are Merlin Xs, which give 1,040 h.p. at 2,500ft. and 965 h.p. at 13,250ft. "Maximum" figures are somewhat higher.

SERVICE AVIATION (CONTINUED)

"*Flight*" photograph

THE FASTEST SQUADRON : Pilots of No. 111 (Fighter) Squadron, Northolt, with Sqn. Ldr. Gillan, the C.O., who flew from Turnhouse to Northolt at 408.75 m.p.h., in the centre, expressing satisfaction and bearing documents.

Royal Air Force Gazette

General Duties Branch

A.V.-M. W. S. Douglas, M.C., D.F.C., is appointed Assistant Chief of the Air Staff at the Air Ministry (February 17).

The following Flight Officers are promoted to the rank of Flight Lieutenant (January 28):—W. A. Hughes, A. F. Hards.

F/O. G. E. Wallace is granted the acting rank of Flight Lieutenant (January 27); Sqn. Ldr. F. H. Whitmore, M.B.E., D.S.C., is placed on the retired list on account of ill health (March 2); Capt. A. C. Newson, Royal Marines, Flt. Lt., R.A.F., relinquishes his temporary commission on return to duty with the Royal Marines (July 1, 1937) (substituted for notifications in the *Gazettes* of July 20, July 27, and August 24, 1937).

Medical Branch

Air Comdre. A. V. J. Richardson, C.B., O.B.E., M.B., B.Ch., D.P.H., K.H.S., is appointed Director of Medical Services, Air Ministry, vice A.V.-M. Sir Alfred W. Iredell, K.B.E., C.B., M.R.C.S., L.R.C.P., K.H.P. (March 1); A.V.-M. Sir Alfred W. Iredell, K.B.E., C.B., M.R.C.S., L.R.C.P., K.H.P., is placed on the retired list at his own request (March 1).

Chaplains Branch

The Rev. A. A. O'Connor is granted a short-service commission with the relative rank of Squadron Leader with effect from January 1.

Royal Air Force Reserve

Reserve of Air Force Officers

Equipment Branch

Flt. Lt. E. A. Sullock, A.F.C., is transferred to the General Duties Branch, Class C (February 10).

Medical Branch

The following relinquish their commissions on appointment to commissions in the R.A.F.V.R. (January 1):—Sqn. Ldr. C. W. Flemming, D.M., M.Ch., F.R.C.S., L.R.C.P.; Flt. Lt. H. C. Smith, M.B., Ch.B.

Royal Air Force Volunteer Reserve

Medical Branch

The following are granted commissions in the ranks stated with effect from January 1, and with seniority of the dates stated:—

Squadron Leader.—C. W. Flemming, D.M., M.Ch., F.R.C.S., L.R.C.P. (July 14, 1936).

Flight Lieutenants.—H. C. Smith, M.B., Ch.B. (June 4, 1933); T. J. B. A. Macgowan, M.B., Ch.M., F.R.C.S. (January 1); R. D. Bruce, M.B., Ch.B. (Jan. 1); L. V. McNabb, M.B., B.S. (Jan. 1).

The following are granted commissions as Flight Lieutenants with effect from March 1—H. B. Bogshaw, M.B., B.Chir., F.R.C.S.(E.), M.R.C.S., L.R.C.P.; H. W. Dryerre, M.B., Ch.B., M.R.C.P.

Royal Air Force Appointments

General Duties Branch

Air Commodores.—R. P. Willock, to Directorate of Staff Duties, Air Ministry; on appointment as Director of Staff Duties, 17.2.38. A. A. B. Thomson, M.C., A.F.C., to H.Q., No. 3 (B.) Group, Mildenhall; on appointment as Air Officer Commanding, 17.2.38.

Group Captains.—G. W. Murlis-Green, D.S.O., M.C., to R.A.F. Station, Cardington, to command, 14.2.38. M. Henderson, C.I.E., D.S.O., to H.Q., Training Command, Market Drayton; for duty as Officer-in-Charge, Administration, 1.2.38. W. B. Farrington, D.S.O., to H.Q., Training Command, Market Drayton; for Equipment (Engineer) Staff duties, 1.2.38. R. S. Maxwell, M.C., D.F.C., A.F.C., to R.A.F. Station, Dhibban, Iraq; to command, 2.2.38. A. S. Morris, O.B.E., to Aircraft Depot, Dhibban, Iraq; to command, 10.2.38. N. H. Bottomley, C.I.E., D.S.O., A.F.C., to H.Q., Bomber Command, Uxbridge; for Air Staff duties, 21.2.38. E. L. Howard-Williams, M.C., to H.Q., Fighter Command, Stanmore; for Equipment (Engineer) duties, 19.2.38.

Squadron Leaders.—W. J. M. Akerman, to H.Q., Bomber Command, Uxbridge; for Air Staff duties, 8.2.38. T. M. Abraham, D.F.C., to H.Q., Coastal Command, Lee-on-the-Solent; for Armament duties, 2.2.38. K. S. Brake, to H.Q., No. 23 (T.) Group, Grantham; for Administrative duties, 31.1.38. W. H. Hutton, to H.Q., No. 17 (T.) Group, Lee-on-the-Solent; for Navigation duties, 7.2.38. R. C. Jordan, to No. 10 (B.) Squadron, Dishforth; for flying duties, 29.1.38. W. J. Millen, to No. 103 (B.) Squadron, Usworth; to command, 19.2.38.

Flight Lieutenants.—N. B. Norris, to No. 7 (B.) Squadron, Finningley, 8.2.38. C. E. Morse, to No. 34 (B.) Squadron, Lympne, 14.2.38. K. Lea-Cox, to No. 611 (W. Lancs) (B.) Squadron, Speke, 7.2.38. J. Goodhart, to H.Q., No. 1 (B.) Group, Abingdon, 11.2.38. E. G. Thompson, to No. 2 Air Armament School, North Coates, 1.2.38. H. C. S. Vetch, to No. 22 (G.R.) Squadron, Thornaby, 5.2.38. H. G. Richards, to No. 1 F.T.S., Leuchars, 25.1.38. F. W. L. Wild, to No. 62 (B.) Squadron, Cranfield, 31.1.38. W. E. Cameron, to No. 8 F.T.S., Montrose, 3.1.38. R. S. Howe, to No. 82 (B.) Squadron, Cranfield, 31.1.38. R. J. Bennett, to No. 216 (B.T.) Squadron, Heliopolis, Egypt, 28.1.38. T. N. Coslett, to No. 216 (B.T.) Squadron, Heliopolis, Egypt, 19.2.38.

Equipment Branch

Wing Commander.—E. H. Eldridge, to No. 4 Equipment Unit, Ruislip; to command, 14.2.38.

Flight Lieutenant.—C. J. Nobbs, to H.Q., R.A.F., Middle East, Cairo, Egypt, 2.2.38.

Accountant Branch

Flight Lieutenant.—M. L. Jones, to Reception Depot, West Drayton, 22.2.38.

Medical Branch

Group Captain.—T. J. Kelly, M.C., to H.Q., Training Command, Market Drayton; for duty as Deputy Principal Medical Officer, 15.2.38.

Wing Commanders.—E. D. D. Dickson, to Central Medical Establishment, London; for duty as Medical Officer, 14.2.38. R. L. C. Fisher, to No. 7 F.T.S., Peterborough; for duty as Medical Officer, 13.2.38. J. Parry-Evans, to No. 1 R.A.F. Depot, Uxbridge; for duty as Medical Officer, 14.2.38.

Squadron Leaders.—F. E. Johnson, to R.A.F. Station, Cardington; for duty as Medical Officer, 16.2.38. C. W. Coffey, to R.A.F. Station, Seletar, Singapore; for duty as Medical Officer, 12.2.38. R. Thorpe, to Aeroplane and Armament Experimental Establishment, Martlesham Heath; for duty as Medical Officer, 15.2.38.

Flight Lieutenant.—F. W. P. Dixon, M.B.E., to R.A.F. Hospital, Aden, 12.2.38.

Owing to the greatly increased length of these lists as a result of R.A.F. expansion, ranks are confined to those of Flight Lieutenant and above.

THE COST of PANIC DEFENCE

Government Estimates That Expenditure Over Five Years Will Exceed £1,500 Million

SIMULTANEOUSLY with the Service Estimates last week the Government issued a Statement on Defence (Cmd. 5682), dealing with all three fighting Services. The concluding paragraph takes the form of a warning that the cost of national defence may prove even greater than the sum mentioned in the White Paper of February, 1937 (Cmd. 5374), and the explanation of that warning is couched in the following terms:—

"The continuous development of modern armaments has given rise in the past twelve months to a number of new needs; and the growing power and complexity of new weapons tends to increase their cost. The flexibility of the whole programme has made it possible to meet by reductions in other directions some part of the increased cost arising from these tendencies, but under present international conditions they must continue to operate and to enlarge the total of expenditure. It must therefore be expected that even on the assumption that 1939, as now seems probable, will be the peak year of defence expenditure, the total expenditure on defence over the five financial years 1937-41 will exceed the sum of £1,500 millions mentioned in the White Paper of February, 1937."

Elsewhere in the Statement it is pointed out that the Estimates for the current financial year provide for a total expenditure by the three Defence Departments (including Royal Ordnance Factories) of £278¼ millions, of which £80 millions was to be met by issues from the Consolidated Fund under the Defence Loans Act, 1937. In addition, about 5¼ millions was provided for air raid precautions schemes. For the year 1938 provision is made in the Estimates of the three Defence Departments for expenditure amounting to £434¼ millions, of which it is proposed to meet £90 millions by issues from the Consolidated Fund under the Defence Loans Act. In addition, nearly £8¼ millions is provided for air raid precautions services. The defence programmes now in hand are regarded as likely to involve defence expenditures in 1939 in excess of the provision made in the Estimates for 1938.

To some extent the Statement on Defence overlaps the Memorandum published with the Air Estimates, but in some cases the same information is given in a slightly different form or contains certain facts not given in the Memorandum.

It is stated that between April and December, 1937, the two anti-aircraft divisions increased their strength by 345 officers and over 9,000 other ranks.

Of the balloon barrage it is said that most of the material has already been delivered and sufficient regular personnel have been fully trained to enable them to supervise and train in their turn the auxiliary personnel who will be primarily responsible for manning the barrage. Recruiting of the auxiliary personnel is expected to start in May.

The divided responsibility for anti-aircraft defence is explained in the Statement as follows: "As regards the system of organisation, the Air Ministry is responsible for the air defence scheme as a whole and the anti-aircraft units of the Territorial Army, which provide the gun and searchlight defences, come directly under the Air Officer Commander-in-Chief, Fighter commands, for operations in war and combined training in peace. Plans are prepared in a Joint Committee, the membership of which includes the Anti-Aircraft Divisional Commanders and representatives of the operations branches of the War Office and Air Ministry, the Air Officer Commander-in-Chief, Fighter Command, being Chairman. The latter has on his staff two General Staff officers from the Army. The Anti-Aircraft Divisional Commanders have their Headquarters with the Commanders of the Fighter Groups in peace. In all operational matters there is direct communication between Headquarters, Fighter Command and the Anti-Aircraft Divisions."

Of purely air force matters dealt with in the Statement the following are of interest: "Notwithstanding the increase of the numbers under training, experience shows that the new pilots are entering the service squadrons from the flying training schools with a higher standard of flying efficiency than formerly. Since April, 1935, approximately 4,500 candidates have been accepted for training as pilots, and 40,000 airmen (including 6,300 apprentices) mostly for training in skilled trades, as compared with a typical pre-expansion entry of approximately 300 pilots and 1,600 airmen a year.

The Volunteer Reserve

"The Royal Air Force Volunteer Reserve, which was recently established to create a reserve of pilots and other personnel, is working very satisfactorily and will be further extended. The estimated pilot entry for the year April, 1937-March, 1938, was 800, but this programme has already been exceeded, and over 1,000 entrants for the pilot reserve have been accepted since April, 1937. The number of centres so far opened is 21, and 12 more will be opened in 1938."

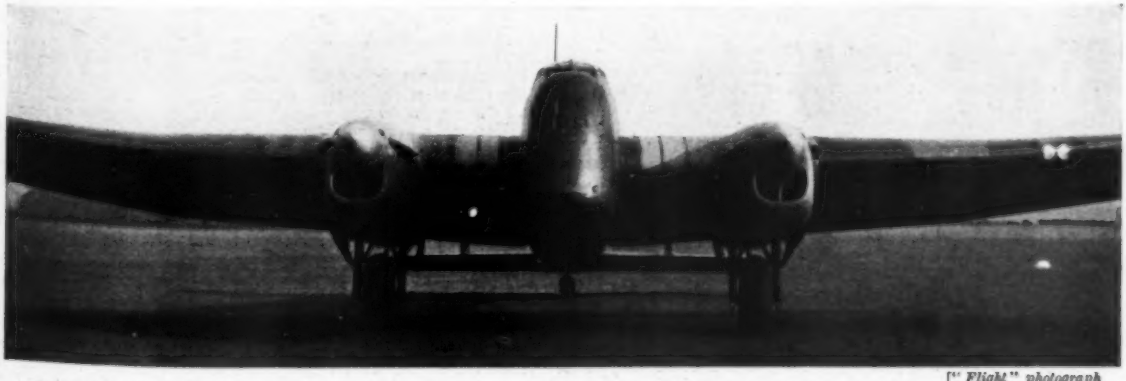
The Statement is curiously reticent on the subject of the handing over to the Admiralty of the control of the Fleet Air Arm, the only paragraph elucidating this important change reading as follows:

"Detailed plans are being worked out by the Admiralty and Air Ministry to give effect to the decision taken in July, 1937, for the transfer to the Admiralty of the administrative control of the Fleet Air Arm. The Air Ministry will be responsible for the training of pilots up to the point when their specialised training begins, after which the Admiralty will assume full responsibility."

The Statement adds no fresh information concerning new ships to be laid down in 1938, but confirms that these include one carrier and one Fleet Air Arm supply and repair ship.

On the subject of production the statement discloses the following interesting information:

"One of the two airframe shadow factories is expected to begin production a few weeks hence and the other later in the year. Other shadow factories for airscrews and carburettors have also started production, and a shadow factory for bombs is on the point of doing so; these factories are additions to the programme as at first conceived, and are examples of the enlargements which the working-out of the programme entails."



["*Flight*" *photograph*

A FASTER WHITLEY: An example of the Armstrong Whitworth Whitley heavy bomber, now in service with Siddeley Tiger engines, has been fitted with Rolls-Royce Merlins of higher power. The new machine, as shown, has temporary fairings over nose and stern gun positions.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

BROADSIDE FIRE

REFERRING to Mr. J. D. North's letter in your issue of March 4, on the subject of broadside fire from aircraft, it would seem that the Magnus effect should result in a considerable disturbance in the trajectory of a projectile fired from a fast aeroplane at right angles to its flight path. On one side of the aeroplane one would expect the trajectory to be raised and on the other side lowered.

The exact amount of the deflection is impossible to calculate as one of the velocities concerned is considerably above the speed of sound, and I know of no data on Magnus effects at such velocities. But it would be reasonable to expect that sights adjusted for normal conditions would be of little use to the gunner under the special circumstances considered here.

London, W.1. W. O. MANNING.

I HAVE read the correspondence *re* broadside fire in *Flight* of March 3 and feel that your reply is very much to the point, as obviously it is very difficult to provide answers to Mr. North's list of questions.

Mr. North took exception to the *effet de Cazaux*, forgetting it seems, that this is only *one* of the arguments against broadside fire. One must also take into consideration the angular velocities of high-speed aircraft in action, for it is ridiculous to expect enemy formations to follow parallel, almost prearranged, courses at the same speeds. The faster machines will obviously take advantage of their better performance and use the armament which is more accurate—their axial guns.

The question of axial velocities has been studied very thoroughly by the French expert, C. Rougeron (who, incidentally, is now Directeur des Armements Aériens at the French Air Ministry), and I would refer to his very conclusive remarks on p. 125 of the April, 1937, issue of the *Royal Air Force Quarterly*. His deductions were confirmed in practice during the Spanish War. Here is an extract from an article, entitled *Les Leçons de la Guerre d'Espagne*, by General Armengaud in the *Revue des Deux Mondes* of August 15, 1937: "The pursuit machine remains by reason of its great speed, the fire power of its axial armament and the relative precision of its close-range fire the redoubtable opponent of the bomber or observation machine, which is, obviously, more bulky and slower. The fire of bombers outside the axial plane is almost impossible with the present speeds of aircraft and it cannot, in any case, be accurate. A speed equal to that of the pursuit machine, or, in any case, very near it, plenty of manœuvrability, small size, and especially axial armament—these are the conditions for the protection of bombers against aerial and terrestrial weapons."

General Armengaud refers to the "insufficient protection" of the big Savoias, Capronis and Junkers, and cites as proof of his argument the success of the smaller and faster Russian Katiouska and the German Dornier—presumably the Do.17. He is a well-known authority on aerial warfare and I do not think his conclusion could be questioned.

Should Mr. North still require specific references in the French press to the *effet de Cazaux* I would refer him to *Les Ailes* for March 15, 1934, page 7, and April 19, 1934, page 6.

London. TACTICIAN.

RESISTANCE WELDING

I WELCOMED the inclusion in *Flight* (November 11, 1937) of an article on the resistance welding of aluminium alloys. Making an extract for future reference I soon found that I was in difficulties with several of Mr. Fassler's points. They are as follows:

(1) "The weight of molten material in a spot $\frac{1}{16}$in. diameter in two sheets of 16 gauge duralumin we find to be 3 grams." The weight of a core of duralumin $\frac{1}{16}$in. diameter and 0.128in. thick is 0.16 grams, approximately, and by the subsequent argument it is this core to which the author refers. The effect of this alteration on the energy required for welding (if we accept the heat losses as 7,000 per cent. of the useful work done) is to decrease the figure of 19,800 calories to 1,050 calories. Doing the arithmetic of adding 25 per cent. to this figure and avoiding the printed 20 per cent., we arrive at the fact that to perform the weld in one second the power required is 1.3 kilowatts (instead of 100 kilowatts). Latent heat may be neglected, but the 7,000 per cent. has a swamping effect on any calculated values of heat required.

(2) The next problem is to find the resistance of the weld. It seems that an error has occurred in using the temperature coefficient, the resistance being .0000146 ohms and, with the 80 per cent. increase, .0000263 ohms. A more important criticism is with regard to the area of 20 sq. cm. (which is very approximately the area of the spot). Does this not imply that contact between the sheets is only at the weld?

(3) Under the cross-heading "Further Investigation" there is a third reference to Joule's Law (the first reference is in fact not an application of Joule's Law at all). The sentence is:—

"Joule's Law reads as follows:

$0.24 \times I^2 \times R \times T$ seconds = gramme calory seconds."

Surely the product of I^2R and time is a quantity of work and must, therefore, be stated in calories? (Again, on the first page of the article a most remarkable unit appears called a "gramme calory Watt second." The correct unit in the latter case is the joule.) Continuing with Joule's Law, Mr. Fassler proceeds to show, with the aid of a "practical figure for impedance," that the weld may be done in 0.4 seconds in spite of the fact that using the same power he has already accepted that it takes one second.

No doubt the figures which Mr. Fassler gives are based on practical experience, but to deduce them from fundamentals seems to require liberal imagination as well as Joule's Law.

Hitchin, Herts. H. R. P. PATTERSON.

[The reason for the delay in publishing this letter is that Mr. Fassler was, and still is, recuperating in Switzerland, and it was desired to publish his reply at the same time as the letter. So far we have not succeeded in obtaining that reply. —ED.]

NAVIGATION—THE BRIGHT SIDE

A GOOD deal has been said and written in criticism of the recently issued modified syllabus of the examination for the Second-class Navigators' Licence.

While the syllabus, as a whole, has not, in my opinion, reached a generally satisfactory degree of perfection, I am definitely strongly in favour of the inclusion of those items which, according to Mr. C. W. Martin (*Flight*, March 3, p. 207), constitute astronomical navigation but which actually are only introductory elements of that branch of navigation.

It is, I consider, most regrettable that anyone connected with navigational training should present to students and prospective students a gloomy picture of difficulty and complication when both are, in reality, non-existent. The determination of the hour angles of the sun, planets and stars is a very simple arithmetical problem, which, if properly presented and carefully explained, is capable of quick and accurate solution by anybody possessing a brain of average capacity; it is certainly far from being a task so involved as to be strictly reserved for treatment by a mathematical or scientific genius, as Mr. Martin seems to indicate. The questions of the daily apparent motion of celestial bodies and of the recognition of planets and stars are likewise simple elements of branch-subjects, while the use of ephemeral tables is easily learned.

With regard to meteorology, the general question of fronts is now a routine item in everyday meteorology and I am surprised that Mr. Martin should seek to render it obscure by employing terms like "frontology" and "frontologists" when referring to such an elementary consideration.

Considering the present rate of progress in the design of aircraft and the continual advancement of aviation generally, it is high time that our navigational knowledge extended beyond simple air pilotage and that everybody concerned faced the subject fairly and sanely. It is, I assert, incumbent upon all those engaged in navigational training to present navigation in its entirety as a normal science capable of being mastered by all who are possessed of average calibre.

In conclusion, I would like to express the opinion that there is no need for any prospective candidate to fall into a state of despondency, as, provided that he is guided aright and is prepared to devote a little time to study, he will follow a very pleasant path to success. H. W. SIMS-WHITE.

Perth.

NO HARM?

SURELY it's rather a silly rule that nobody under the age of 17 years is allowed to hold a flying licence. I mean, if one has the ability to fly and can come through the tests, however strict, with flying colours, there can be no harm in granting him his licence. I wonder if any of your readers can point out where I am wrong.

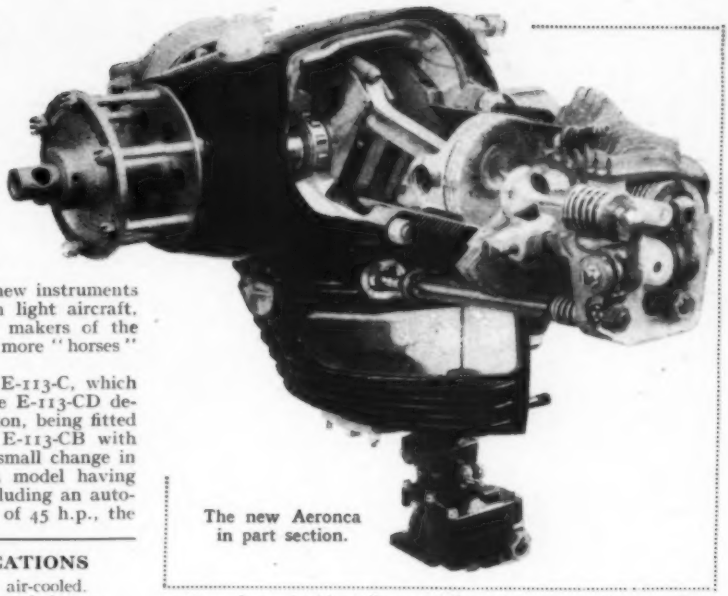
Deal. I. S. PHILCOX. (13 yrs.).

IMPROVED AERONCA ENGINE

Three New Versions

IN order to counterbalance the additions of new instruments and more luxurious equipment on modern light aircraft, the Aeronautical Corporation of America, makers of the well-known Aeronca twin, have found a few more "horses" in carefully modified versions of the engine.

There are now three versions based on the E-113-C, which is rated at 40 h.p. at 2,540 r.p.m. First, the E-113-CD delivering 42 h.p. at 2,500 r.p.m. has dual ignition, being fitted with two Bosch magnetos. Secondly, the E-113-CB with similar power rating and engine speed, has a small change in the cam action and timing gears. Lastly, a model having dual ignition and all recent improvements, including an automatic overhead oiling system, gives an output of 45 h.p., the extra 3 h.p., incidentally, enabling it to carry the imposing designation "Aeronca '45,' E-113-CBD. ATC 189."



The new Aeronca in part section.

AERONCA "45" ENGINE SPECIFICATIONS

TYPE.—7 cylinder, horizontal opposed, O.H.V., air-cooled.
WEIGHT COMPLETE.—125 lb., including 2 magnetos and airscrew hub.
RATED H.P.—45 at 2,500 r.p.m.
CYLINDER BORE.—108 mm. (4¼in.).
STROKE.—101.5 mm. (4in.).
TOTAL DISPLACEMENT.—1,860 c.c. (113.5 cu. in.).
COMPRESSION RATIO.—5.4 to 1.
OIL RESERVOIR.—3 qt. in crankcase.
OIL CONSUMPTION (Cruising).—¼ pt./hr.
FUEL CONSUMPTION (Cruising).—3 gall./hr., full throttle 3½ gall./hr.
FUEL RECOMMENDED.—73 octane.
TAPPET CLEARANCE.—0.005in. on both valves with cold engine.

It is pointed out that by carrying the whole by-passed oil supply from the pump to the rockers and returning it from the aluminium rocker covers through the push-rod tubes (a) additional oil cooling is achieved; and (b) the push-rods are kept hot and expand proportionately with the cylinder barrels, so maintaining more accurate tappet clearances.

The current model Aeronca engine is built under licence in this country by J. A. Prestwich and Co., Ltd., and distributed by Aircraft Exchange and Mart, Ltd., 7, Park Lane, London, W.1.

FOR ADVANCED MILITARY TRAINING

"Low-Mid-Wing" Monoplane by Koolhoven : Cheetah Engine Standard

British equipment figures prominently in the Dutch Koolhoven two-seat trainer

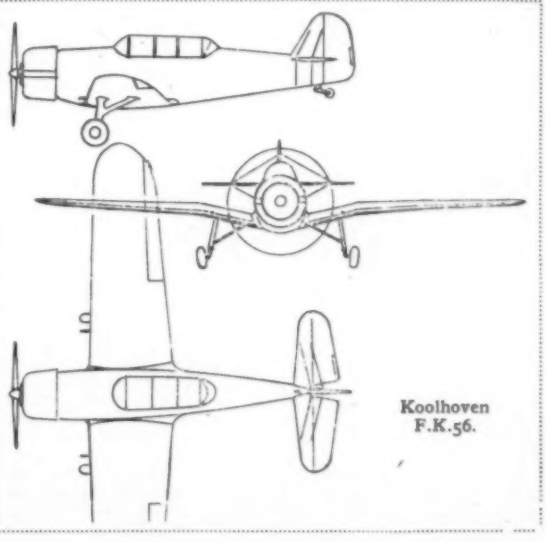
RESEMBLING in layout the little Koolhoven Junior, a new advanced trainer has lately been completed at the Koolhoven plant. Designated the F.K.56, the type is a two-seater of mixed construction. The inner portions of the gull-type wings are swept upward, bringing the outer panels to a height corresponding to the mid-wing position. Mr. Koolhoven claims that this arrangement combines the structural simplicity of the low-wing layout with the better handling qualities and improved stability of the mid-wing type.

The fuselage, which has two seats in tandem, with a transparent roof, is a welded-steel-tube structure, but the wing is of wood with box spars, three-ply ribs and stressed three-ply skin. Slotted ailerons are incorporated. The undercarriage has two independent halves utilising Koolhoven oleo struts, Dunlop medium-pressure tyres and hydraulic brakes. The tracking Ecta tail-wheel is restrained by shock-absorber cords.

An Armstrong Siddeley Cheetah engine is fitted as standard, but alternative power plants are the Wright Whirlwind or Pratt and Whitney Wasp Junior. There is a sixty-gallon fuel tank in the forward fuselage bay and an oil tank behind and above the engine.

Armament comprises two fixed machine guns in the wing, these being placed behind the rear spar according to a patented Koolhoven method. A special Koolhoven mounting is provided for the rear free gun. The spaciousness of the rear cockpit allows for the installation of a bomb sight, camera, or wireless apparatus, and bombs may be carried below the wings.

Data relating to the F.K.56 are: Span, 38ft.; length, 26ft.; wing area, 215 sq. ft.; weight empty, 220 lb.; normal flying weight, 3,305 lb.; top speed, 187 m.p.h.; landing speed, 56 m.p.h.; climb to 13,000ft., 17.6 min.; service ceiling, 19,000ft.; range, 500 miles.



Koolhoven F.K.56.

THE INDUSTRY

B.I.F. Echoes : D.H. Durability : Napier General Meeting : Cirrus-engined Magisters : Coupling the Composite

FINE FINISHES : The Titanine stand was one which added colour to the Castle Bromwich section of the British Industries Fair.

Coolers at the B.I.F.

A COMBINED radiator and oil cooler for a fighter which has lately been much in the news was among the exhibits on the stand of Serck Radiators, Ltd., at the British Industries Fair.

Similar equipment for another famous fighter and also for an equally famous medium bomber is being supplied by the firm, which is also making cooling components for prototype aircraft. Experimental work is facilitated by means of a wind tunnel recently installed for the purpose.

Experience in aircraft radiators enabled Serck to surmount the special problems involved in cooling Capt. Eyston's record-breaking cars, *Thunderbolt* and *Speed of the Wind*.

The Serck Company's headquarters are at Warwick Road, Birmingham, 11.

After 1,000 Hours

IN September last year, as the outcome of operating experience with some 2,200 Gipsy Major engines, the De Havilland Company raised the recommended period between overhauls from 750 to 1,000 hours, that is, about 100,000 air miles. To schools, and to commercial concerns operating regular services, this was a considerable benefit, for it is often the practice to take an engine from one machine in for airframe overhaul and use it in another.

To private owners it is more a proof of dependability, for with many people a yearly overhaul is the rule, regardless of hours or condition.

Recent facts collected during the examination of a Gipsy Major engine which had completed its 1,000 hours with a school, tends to disprove the accepted idea that if something is not quite right in an engine it may continue to function for the whole period, but be a partial "write-off" at the end, whereas adjustment at 500 or so hours may save the part, or parts, involved.

In the Major engine examined practically no parts called for rejection. Ground engineers reported that it was running well at 1,000 hours and that compression was satisfactory. No serious wear had occurred in any of the parts and, with a very few exceptions, they were accepted for reassembly. To mention individual parts, it is stated that pistons showed no excess carbon deposit and all rings were free. Two exhaust valves had undersized stems and one had a slight defect on the seating. Bearings were dimensionally satisfactory, but certain of them had hair cracks in the white metal round the dowel pins. One cooling baffle was rejected for a worn hinge. One oil pipe nipple had been distorted by over-tightening. A magneto rocker arm with bush and points was discarded, due to wear. Two small magneto ball bearings were scrapped through wear, and a carburettor tickler valve and knob needed renewal. It is, of course, standard practice on overhaul to replace packings, jointing washers and locking plates; and, whether they are serviceable or not, exhaust-valve guides are scrapped on stripping.

The 1,000-hour inter-overhaul period, it should be noted, applies to the Gipsy Major I engine and not to the new Series II unit, which operates under more trying conditions.

A Desoutter Appointment

MR. HUGH BERGEL, who is a well-known member of the gliding community, is shortly joining Desoutter Bros., Ltd., as sales and advertising manager.

Oil in the Hurricane

FOLLOWING Sq. Ldr. Gillan's high-speed flight in the Hawker Hurricane from Edinburgh to Northolt at 408.75 m.p.h., Frank How and Co., Ltd., of Trogon Wharf, London, S.W.6, state that their "Trogon" aero oil was used in the Rolls-Royce Merlin engine.

International Aircraft Directorship

INTERNATIONAL Aircraft and Engineering, Ltd., of Barton Airport, Beds, state that Mr. H. F. Odroft and Mr. D. O. Summers have been appointed to the board.

Statements by Sir Charles Rose and Mr. W. J. Leeming that they (Sir Charles and Mr. Leeming) had resigned their directorships were reported recently.

Napier Developments

"THANKS in the main to Major Halford, who has been responsible for designing the Rapier and Dagger engines which are now in service and giving every satisfaction, leeway has in large measure been made up."

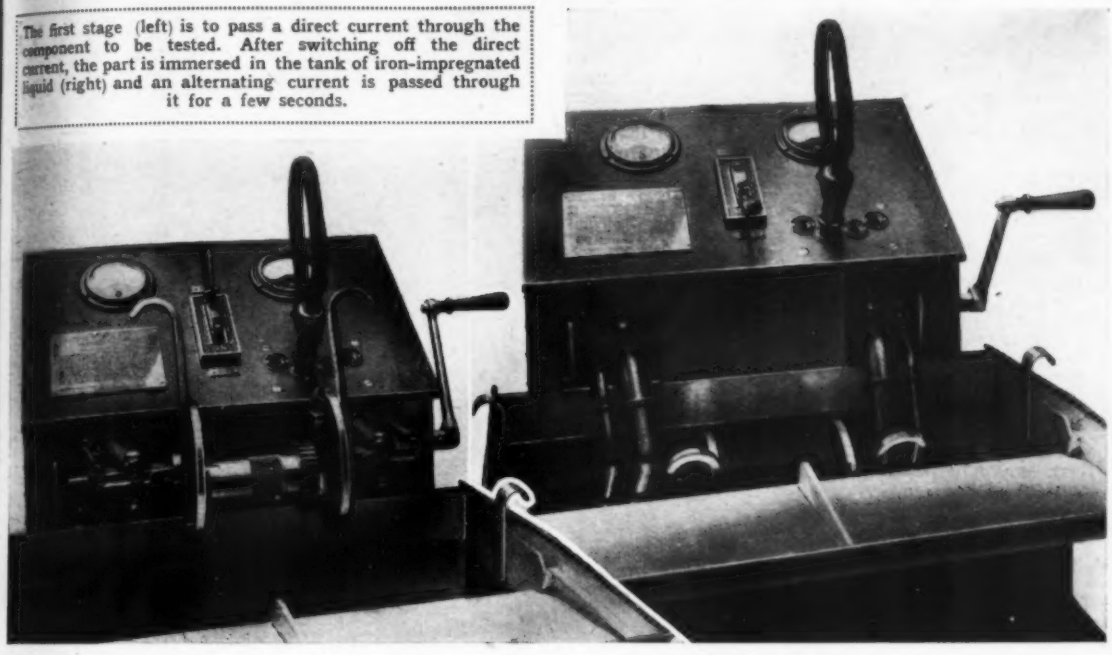
Thus Sir Harold Snagge, addressing the shareholders at the twenty-fourth ordinary general meeting of D. Napier and Son, Ltd., last week. He had been able to announce a greatly improved trading result—a profit of £58,172 for the year.

"Apart from these engines," said Sir Harold, "we have in hand development work of great importance, in regard to which I am precluded from speaking with any precision, but upon which we have reason to build the highest hopes."

The only Gipsy Major parts needing replacement after 1,000 hours service.

THE INDUSTRY (CONTINUED)

The first stage (left) is to pass a direct current through the component to be tested. After switching off the direct current, the part is immersed in the tank of iron-impregnated liquid (right) and an alternating current is passed through it for a few seconds.



FAULT DETECTION

A New Method of Inspecting Aero Engine Components

A NEW and improved apparatus for inspecting steel aero engine components, using the electro-magnetic flux principle, has been developed jointly by the engine Department of the Bristol Aeroplane Co., Ltd., and the Metropolitan-Vickers Electrical Co., Ltd.

For several years the Bristol Company has extensively employed the well-known Magnaflux and Electroflux tests. It will be recalled that both of these tests are based upon the principle of subjecting the component to an intense electro-magnetic field and coating it with a liquid containing finely divided particles of iron. Any cracks that may exist in the component are then revealed by the accumulation of iron particles around their edges, due to local disturbance of the magnetic lines of force. In the Magnaflux method an electro magnet is so arranged that its principal lines of force pass longitudinally across a gap formed by two pole pieces between which the component is placed. In the Electroflux test, on the other hand, a heavy electric current is passed through the component itself, and generates within the latter a magnetic field whose lines of force form a series of rings in planes normal to the path of the current.

Due to the respective arrangements of the magnetic lines of force, these two tests are each directional, to a certain extent, in their sensitivity to the presence of cracks. Relative to the horizontal axis of the component as placed in position for test, the Electroflux method is more vigorous in disclosing longitudinal cracks, whilst the Magnaflux more readily detects transverse cracks.

Whilst in actual practice both methods are sufficiently adaptable to render very good service in the inspection of a wide variety of components, it has been found that there are certain cases where either method by itself is not absolutely infallible.

The new apparatus now introduced, however, combines the advantages of both the Magnaflux and Electroflux instruments. As will be seen from the accompanying photographs, this combined instrument is very compact, and simple to operate. The inspection is carried out in two stages. First, the component is gripped between the two hinged pole pieces of the electro magnet as shown on the left. The control switch is then moved so as to pass direct current through the solenoid coil surrounding the magnet core, which is contained within the cabinet. The component is thus fully magnetised.

Next, the direct current is switched off and the pole pieces moved downwards by a handle until the component is completely immersed in the tank of iron-impregnated liquid, as shown on the right. Thereupon, the switch is moved over to pass a heavy alternating current through the component for a few seconds, thus temporarily superimposing a transverse magnetic field upon the longitudinal one still retained by the component. The latter is then removed for visual examination of any cracks revealed by the deposition of iron particles.

Components which have satisfactorily passed the test are afterwards demagnetised completely by passing them through the field of a separate electro magnet energised by alternating current.

The new instrument has already proved its great value for the closer inspection of certain components, where the occasional presence of minute cracks has hitherto been suspected, but not revealed by either the Magnaflux or the Electroflux tests. A further link has thus been added to the chain of vigilant inspection operations which maintain the very high quality of Bristol engines.

A 24-ft. Airscrew!

THE casual visitor to the Airscrew Company's factory at Weybridge might well be astounded on encountering a two-bladed wooden airscrew of *twenty-four feet* diameter.

On regaining his powers of speech and enquiring as to the aeroplane for which it was intended, he would learn that it was not an aircraft component at all, but a fan, as used in industrial cooling towers.

Properly designed airscrew-type ventilating and forced-draught fans have, it is claimed, a number of advantages over the orthodox centrifugal type. The Airscrew Company are obviously in a position to design them properly, and a catalogue sets forth details of all types downwards from the industrial giants mentioned. Wind-tunnel fans are included.

THE INDUSTRY (CONTINUED)

Start of the Finish

ENTITLED "The Beginnings of Finishes," a brochure published by Cellon, Ltd., contains some of the most attractive photographs we have seen for a long time. All concern tests and processes used in the production of Cellon dopes and finishes, and they are so finely posed and lighted that they compel attention. More clearly than any words the pictures explain the "scratch test," the "drying-time meter," the "ultra-violet sunlight exposure test," and many other phases of the work in the laboratories of Cellon, Ltd., at Kingston-on-Thames.

Luton Occasion

CAPTAIN E. W. PERCIVAL was in the chair at the annual dinner of Percival Aircraft, Ltd., and among the guests was an old friend of his, Mr. Stuart Campbell, of Australia, the chief pilot who did all the flying for the Mawsun Expedition to the South Pole in 1931.

Others in attendance were Major Eyre (a director of Percival Aircraft), M. le Comte Guy de Chateaubrun (the Company's French agent), Mr. W. A. Summers (works manager), Mr. J. Buist Mackenzie (secretary) and Mr. A. A. Bage (chief draughtsman). The guests included Messrs. Rumbold and Kybert, Brown (A.I.D.), Fitch (R.T.O.), Davey, Morse and Adams (of de Havillands), and the Luton Airport manager, Mr. Rushton.

Amenable Alloy

AMONG the materials used in the Short-Mayo composite aircraft is an alloy with some interesting characteristics.

This is "Camloy," an anti-corrosion alloy which differs from ordinary stainless steel in a number of respects, chief among which, it is claimed, is its amenability to cold working, deep stamping, forming and drawing, combined with ease of welding, though without liability to "weld decay."

Its tensile strength is 35/40 tons/sq. in. and it is said to have exceptional resistance to heat and to salt spray. "Camloy," which is particularly in demand for exhaust tubing, high-pressure radiating systems and so forth, is made by L. Cameron and Son, Margaret Street, Sheffield, 1.

A D.H. "Internal" Affair

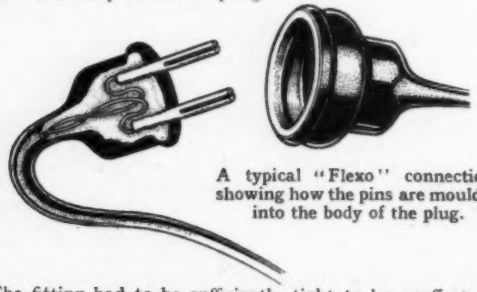
FOREMEN and charge-hands of the Aircraft Division of the De Havilland Company foregathered for their second smoking concert at the Aerodrome Restaurant, Hatfield, recently, under the chairmanship of Mr. L. C. L. Murray, aircraft general manager.

A more congenial fellowship it would indeed be difficult to imagine, and it is a pity one cannot convey to users of De Havilland products some real insight into the personalities of these men whose supervision in the factory means so much to pilot and operator. The speeches, greatly enjoyed, were by Mr. J. Harvey (wood-detail foreman), Mr. Murray, Mr. W. E. Nixon (secretary and director of the company), Mr. F. T. Hearle (general manager and director) and Mr. R. Gillan (metal machine-shop foreman).

Breaking Off Relations

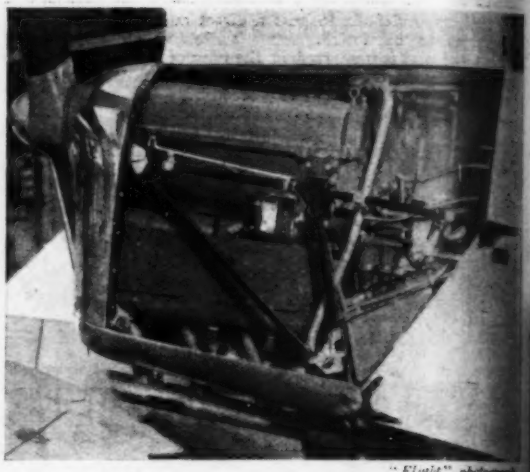
THE problem of severing connections between *Maia* and *Mercury*—the Short-Mayo composite craft—included the breaking of six electrical connections for instruments and telephones.

For the purpose, the Intex Engineering Co., Ltd., of 15, Dartmouth Street, London, S.W.1, makers of Flexo cables, moulded a six-pin, flat coupling.



A typical "Flexo" connection, showing how the pins are moulded into the body of the plug.

The fitting had to be sufficiently tight to be unaffected by vibration or wind, but at the same time loose enough to prevent the tearing of the leads from the machines on parting.



"Flight" photograph

CIRRUS-MAGISTER: The first few of a batch of Cirrus Major 150 engines have been installed in Miles Magisters and encouraging results obtained. Externally, the new Cirrus combined manifold and exhaust pipe are apparent.

These Flexo cables and connections, incidentally, are applicable to almost any current-carrying job; the internal connections in the adaptors, plugs, etc., are not subject to any strain, the wires and pins being moulded in; and the system can be supplied in a water- and gas-tight form.

Our associated journal, *The Electrical Review*, has estimated that 36 per cent. of electrical failures, all avoidable, are due to faulty or cheap wiring, and that the "short" usually occurs at the entry to a plug or adaptor.

Anticipated

THE new West London service building of Brown Brothers, Ltd., is under construction, and, although rapid progress is being made, it is not, as was reported recently, already open.

NEW COMPANIES

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

ROTHON RADIATORS LTD.—Private company, registered February 16. Capital £500. Objects: to acquire the business of a motor car and aero engine radiator maker and repairer carried on by A. E. Rothon at 37, Palmerston Road, Boscombe. The directors are Arthur E. Rothon (permanent managing director) and Eric Winnard. Registered office: 4, Stewart Road, Bournemouth.

AERONAUTICAL PATENT SPECIFICATIONS.

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

(Published March 3, 1938).

15289. SPERRY GYROSCOPE CO., INC.: Gyroscopic apparatus (479,279).
21061. SUTTON, H., and WILLSTROP, J. W. W.: Prevention of corrosion of metals in contact with ethylene glycol and other media for cooling internal combustion engines, or for preventing ice formation on aircraft parts (479,346).
21528. AIVAZ, J.: Tank, in particular for aircraft and motor vehicles (479,466).
21712. KAY, D.: Aero-revolving wings or blades (479,461).
3005. MOSS, D. G. K., and PEIRCE, H. C. (trading as MECHANISM): Gyroscopic navigational instruments (479,243).
9278. STRUBE, C.: Apparatus with a plurality of driving shafts for the control of aircraft landing gear (479,398).
19738. LORENZ AKT.-GES., C.: Directional wireless antennæ (479,330).
28201. AIVAZ, J.: Tank for aircraft and motor vehicles (479,498).

(Published February 24, 1938.)

17531. KOLLSMAN, P.: Vertical speed indicators for aircraft (478,952).
25390. WESTLAND AIRCRAFT, LTD., and PETTER, W. E. W.: Aircraft (478,889).
25669. GETEFO GES. FUR TECHNISCHEN FORTSCHRITT: Mounting of aircraft engines (478,752).
143. FAIREY AVIATION CO., LTD., BRAY, F. C., BUDD, O. J., and ROBERTS, H. F.: Means for securing fabric to aircraft wings and the like (478,855).
2214. GETEFO GES. FUR TECHNISCHEN FORTSCHRITT: Mountings for engines, especially on aircraft (478,909).
3764. ASKANIA-WERKE AKT.-GES VORM. CENTRALWERKSTATT DESSAU UND C. BAMBERG-FRIEDENAU: Automatic control or steering, particularly for use in aircraft (478,777).
5499. MERCIER, J.: Retractable landing-gear of aeroplanes (478,778).
14544. MERCIER, P. E.: Cowlings for aircraft engines (478,935).
15475. FAUDI, F. (Trading as FAUDI, F. (Firm of)): Undercarriages for aircraft (479,094).
18459. ASKANIA-WERKE AKT.-GES. VORM. CENTRALWERKSTATT DESSAU UND D. BAMBERG-FRIEDENAU: Direction-indicating means for use on land, air or water craft (478,799).
29068. STEVENS, A. H. (Sperry Gyroscope Co., Inc.): Means for directing anti-aircraft gun-fire (479,019).
31268. VICKERS (AVIATION), LTD., and WALLIS, B. N.: Aircraft gun mountings (478,955).